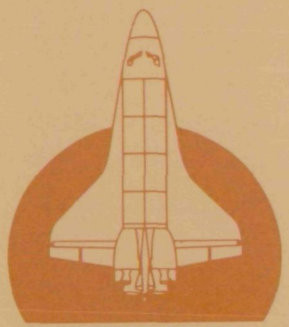
NASA SP-7011(212)

NASA

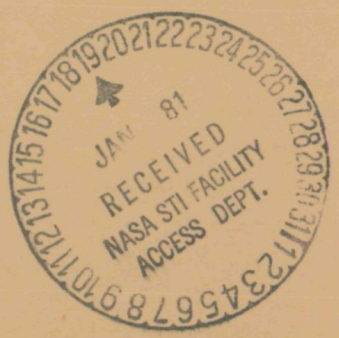
Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011 (212)
November 1980



SHUTTLE LAUNCH
MARCH 1981

National Aeronautics and Space Administration



Aerospace Medicine & Biology
& Biology Aerospace Medicine
Medicine & Biology Aerospace M
ospace Medicine & Biology Aer
logy Aerospace Medicine & Bio
cine & Biology Aerospace Medi
ce Medicine & Biology Aerospa
Aerospace Medicine & Biology
& Biology Aerospace Medicine
Medicine & Biology Aerospace M
ospace Medicine & Biology Aer
logy Aerospace Medicine & Bio

Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

Pages 217-238

November 1980

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N80-28295 – N80-30271
IAA (A-10000 Series)	A80-43839 – A80-47366

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by PRC Data Services Company.

NASA SP-7011(212)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 212)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in October 1980 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

NASA Scientific and Technical Information Branch 1980
National Aeronautics and Space Administration
Washington, DC

NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.

This supplement is available as NTISUB/123/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of $7.00 domestic; $14.00 foreign.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 146 reports, articles and other documents announced during October 1980 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1980 Supplements.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A80-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies of accessions are available at $7.00 per document up to a maximum of 40 pages. The charge for each additional page is $0.25. Microfiche [1] of documents announced in *IAA* are available at the rate of $3.00 per microfiche on demand, and at the rate of $1.25 per microfiche for standing orders for all *IAA* microfiche. The price for the *IAA* microfiche by category is available at the rate of $1.50 per microfiche plus a $1.00 service charge per category per issue. Microfiche of all the current AIAA Meeting Papers are available on a standing order basis at the rate of $1.50 per microfiche.

Minimum air-mail postage to foreign countries is $1.00 and all foreign orders are shipped on payment of pro-forma invoices.

All inquiries and requests should be addressed to AIAA Technical Information Service. Please refer to the accession number when requesting publications.

STAR ENTRIES (N80-10000 Series)

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code followed by the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Documents on microfiche are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.50 price, for those documents identified by a # symbol.)

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free.

Other availabilities: If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line.

SUBSCRIPTION AVAILABILITY

This publication is available on subscription from the National Technical Information Service (NTIS). The annual subscription rate for the monthly supplements, excluding the annual cumulative index, is $50.00 domestic; $100.00 foreign. All questions relating to the subscriptions should be referred to NTIS.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Fachinformationszentrum Energie, Physik,
Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

NTIS PRICE SCHEDULES

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective January 1, 1980)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.50	$ 5.25
A02	001-025	5.00	10.00
A03	026-050	6.00	12.00
A04	051-075	7.00	14.00
A05	076-100	8.00	16.00
A06	101-125	9.00	18.00
A07	126-150	10.00	20.00
A08	151-175	11.00	22.00
A09	176-200	12.00	24.00
A10	201-225	13.00	26.00
A11	226-250	14.00	28.00
A12	251-275	15.00	30.00
A13	276-300	16.00	32.00
A14	301-325	17.00	34.00
A15	326-350	18.00	36.00
A16	351-375	19.00	38.00
A17	376-400	20.00	40.00
A18	401-425	21.00	42.00
A19	426-450	22.00	44.00
A20	451-475	23.00	46.00
A21	476-500	24.00	48.00
A22	501-525	25.00	50.00
A23	526-550	26.00	52.00
A24	551-575	27.00	54.00
A25	576-600	28.00	56.00
A99	601-up	-- 1/	-- 2/

1/ Add $1.00 for each additional 25 page increment or portion thereof for 601 pages up.

2/ Add $2.00 for each additional 25 page increment or portion thereof for 601 pages and more.

Schedule E

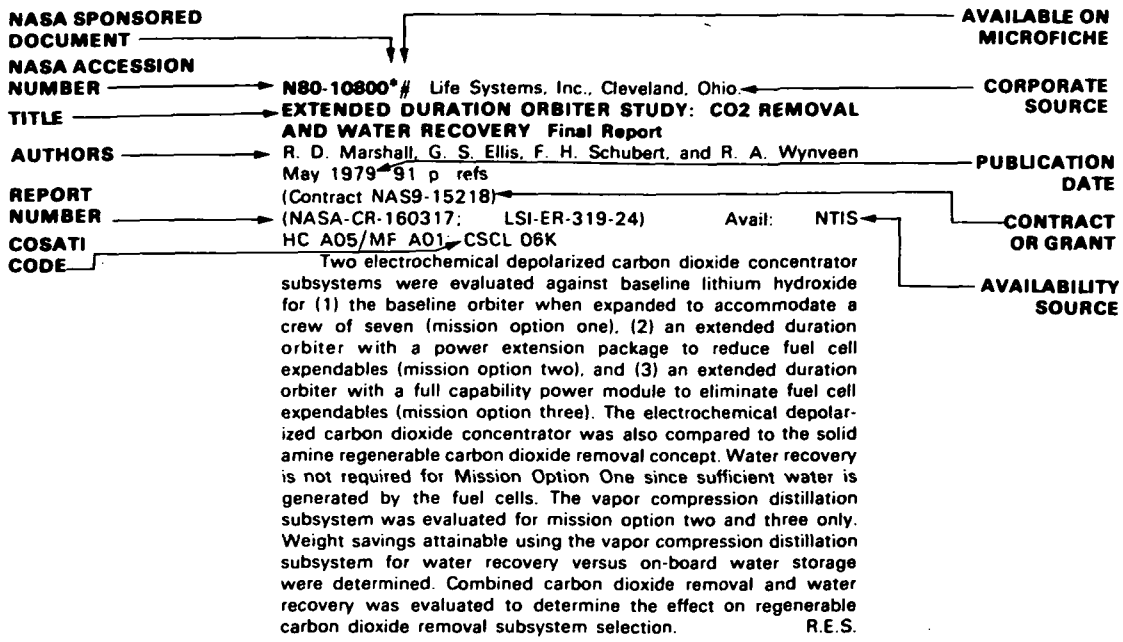
EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

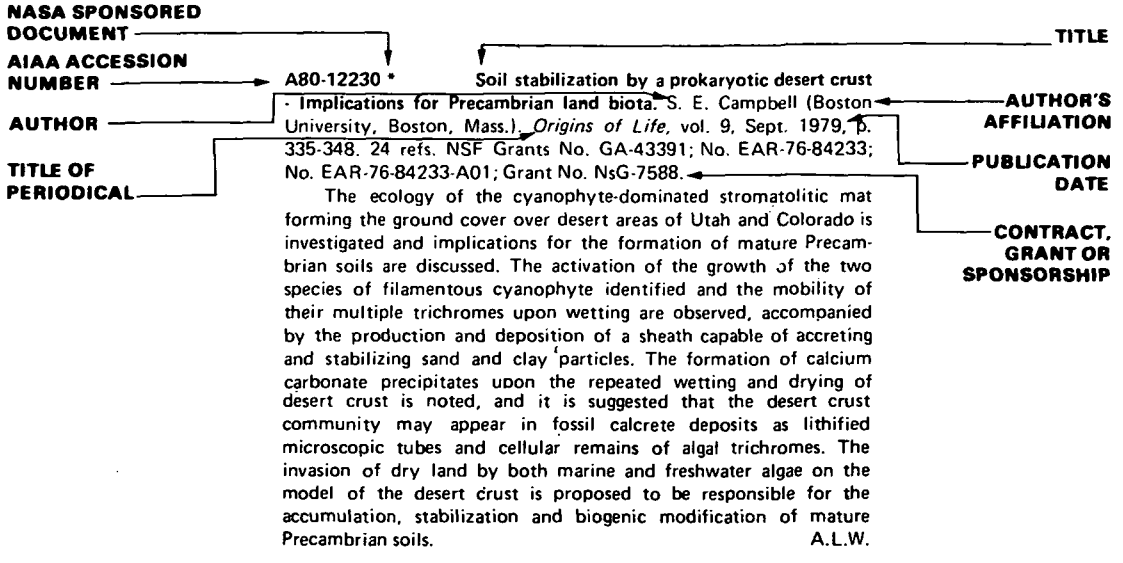
Price Code	North American Price	Foreign Price
E01	$ 5.50	$ 11.50
E02	6.50	13.50
E03	8.50	17.50
E04	10.50	21.50
E05	12.50	25.50
E06	14.50	29.50
E07	16.50	33.50
E08	18.50	37.50
E09	20.50	41.50
E10	22.50	45.50
E11	24.50	49.50
E12	27.50	55.50
E13	30.50	61.50
E14	33.50	67.50
E15	36.50	73.50
E16	39.50	79.50
E17	42.50	85.50
E18	45.50	91.50
E19	50.50	100.50
E20	60.50	121.50
E99 - Write for quote		
N01	28.00	40.00

TABLE OF CONTENTS

TYPICAL CITATION AND ABSTRACT FROM *STAR*



TYPICAL CITATION AND ABSTRACT FROM *IAA*



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 212)

NOVEMBER 1980

IAA ENTRIES

A80-44125 **Biological studies on the Cosmos biosatellite (Biologicheskie issledovaniia na biosputnikakh 'Kosmos').** Edited by E. A. Il'in and G. P. Parfenov. Moscow, Izdatel'stvo Nauka, 1979. 240 p. In Russian.

Results of biological experiments performed on board recent Soviet Cosmos biosatellites are reviewed, with attention given to the joint Soviet-American investigations on board Cosmos 782 and 936. The significance of biological experiments in space is discussed, and consideration is also given to the design and control of biosatellites and their life support equipment and scientific instruments. Results are then presented for studies of the effects of weightlessness on the development and vestibular apparatus of the fish Fundulus heteroclitus, drosophila genetics and development, isolated carrot cell morphogenesis and embryogenesis, carrot tissue development, anatomy and biochemistry, and the orientation, growth and development of higher and lower plants. Experiments on the effects of artificial gravity and cosmic radiation on dried seeds, the effects of the space environment on mammalian cell cultures and on bacterial genetics are also indicated. A.L.W.

A80-44195 **Magnetic study of the His-Purkinje conduction system in man.** D. E. Farrell, J. H. Tripp (Case Western Reserve University, Cleveland, Ohio), and R. Norgren (California, University, Livermore, Calif.). *IEEE Transactions on Biomedical Engineering*, vol. BME-27, July 1980, p. 345-350. 22 refs. Research supported by the American Heart Association; NSF Grant No. ENG-77-15952-A01.

It has recently been suggested that depolarization of the entire His-Purkinje conduction system of the heart produces a characteristic waveform in the surface electrocardiogram. The magnetic probe offers a different and, in some respects, advantageous means of observing such waveforms, and extensive records of the surface magnetic field generated by the human heart have been obtained for four normal subjects. A first-order SQUID gradiometer was employed having the lowest noise level yet reported in any biomagnetic study (6 x 10 to the -15th T/square root of Hz). Using an on-line computer, 100 beat averages were taken at 49 positions over the chest on a 1 in. square grid. The fields observed have a characteristic symmetry and provide support for the suggestion that events associated with depolarization of the conduction system may be observed at the surface of the torso. (Author)

A80-44196 **Long-term biological effects of very intense 60 Hz electric field on mice.** W. Z. Fam (Nova Scotia Technical College, Halifax, Canada). *IEEE Transactions on Biomedical Engineering*, vol. BME-27, July 1980, p. 376-381. 10 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada.

This paper presents the results of long-term exposure of mice to a 240 kV/m, 60 Hz electric field. Both males and females were subjected to this very intense field for over 4500 h before they were sacrificed for tests. The progenies resulting from breeding the various couples were also exposed to the same field. Studies were made to determine the effects of the electric field on drinking water consumption, rate of growth, body weight, number of progenies born and survived, blood count and blood chemistry, protein analysis, and organs histology. In each study, the results were compared with those obtained from the corresponding control group. (Author)

A80-44201 * # **Development of a multi-media crew-training program for the terminal configured vehicle mission simulator.** J. A. Rhouck and A. T. Markos (NASA, Langley Research Center, Hampton, Va.). *Society for Computer Simulation, American Meteorological Society, and Instrument Society of America, Summer Computer Simulation Conference, Seattle, Wash., Aug. 25-27, 1980, Paper.* 6 p. 6 refs.

This paper describes the work being done at the National Aeronautics and Space Administration's (NASA) Langley Research Center on the development of a multi-media crew-training program for the Terminal Configured Vehicle (TCV) Mission Simulator. Brief descriptions of the goals and objectives of the TCV Program and of the TCV Mission Simulator are presented. A detailed description of the training program is provided along with a description of the performance of the first group of four commercial pilots to be qualified in the TCV Mission Simulator. (Author)

A80-44213 * **Visually induced self-motion sensation adapts rapidly to left-right visual reversal.** C. M. Oman, O. L. Bock, and J.-K. Huang (MIT, Cambridge, Mass.). *Science*, vol. 209, Aug. 8, 1980, p. 706-708. 16 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

The experimental demonstration of a reversal of the circular-vection (CV) phenomenon is reported. After one to three hours of active movement while wearing vision-reversing goggles, 9 of 12 stationary human subjects viewing a moving stripe display experienced a self-rotation illusion in the same direction as the seen stripe motion. In addition, the subjects showed a 17% reduction in vestibulo-ocular reflex slow phase gain over their brief exposure period. It is noted that whether a subject demonstrated reversed CV within the allowed exposure period appeared to be correlated with CV strength produced with a narrow field stimulus. J.P.B.

A80-44249 **Maximal cardiac output during upright exercise - Approximate normal standards and variations with coronary heart disease.** K. F. Hossack, R. A. Bruce, B. Green, F. Kusumi, T. A. DeRouen, and S. Trimble (Washington, University, Seattle, Wash.). *American Journal of Cardiology*, vol. 46, Aug. 1980, p. 204-212. 28 refs. Research supported by the American Heart Association of Washington; Grants No. NIH-HL-23404; No. NIH-RR-37.

A80-44441 # **Interpretation of findings of the biological experiments of the Viking lander on Mars (Zur Interpretation der Befunde der biologischen Experimentiereinheiten der Viking-Landesonden auf dem Mars).** S. Fränzle. *Sterne und Weltraum,* vol. 19, July-Aug. 1980, p. 258-260. 10 refs. In German.

The biological experiments aboard the Viking lander encompassed three aspects: (1) experiments to determine a chemical reaction of nutrient solutions, (2) gas exchange experiments between the ground and the atmosphere, and (3) studies on photosynthesis and chemical synthesis. The significance of the measured results is examined in detail. M.E.P.

A80-44593 # **Ocular risks of astronomical observations (Risques oculaires des observations astronomiques).** G. Quentel (Cretéil, Hôpital Intercommunal, Cretéil, Val-de-Marne, France). *L'Astronomie,* vol. 94, July-Aug. 1980, p. 311-317. In French.

The mechanism and physiological reason for retinal alterations from the astronomical observation of the sun are examined. Attention is given to the constitution of the eye, the image formed on the retina, and the foveolate region. It is noted that in the absence of all movement, a lesion will create a definitive and irreversible alteration of the eye when the acuity is high, in the case of binoculars as well as telescopes. J.P.B.

A80-44608 * **Three-dimensional structure of Escherichia coli initiator tRNA/f//Met/.** N. H. Woo, A. Rich (MIT, Cambridge, Mass.), and B. A. Roe (Kent State University, Kent, Ohio). *Nature,* vol. 286, July 24, 1980, p. 346-351. 23 refs. Research supported by the American Cancer Society, NIH, NSF, and NASA.

The crystal structure of Escherichia coli tRNA(f)(Met), an initiator transfer RNA, has been determined. While grossly similar to that of the chain-elongating yeast tRNA(Phe), there are three major differences. One involves the folding of the anticodon loop; in particular, the position of the constant uridine, U33. This difference was unexpected and may be of functional significance. (Author)

A80-44765 **Parallel visual pathways - A review.** P. Lennie (Sussex, University, Brighton, England). *Vision Research,* vol. 20, no. 7, 1980, p. 561-594. 210 refs.

Within the last fifteen years it has become clear that the principal visual pathway in higher mammals, which connects the retina to the cortex via the dorsal lateral geniculate nucleus may fruitfully be regarded as a group of parallel pathways, each containing neutrons that have distinctive physiological properties and which presumably contribute distinctively to vision. The aims of this paper are first, to examine the properties that characterize the neurons of the different classes and to understand what mechanisms might underlie the differences; second, to trace the major central projection of the different cell types; and third, to try to understand their significance for seeing. The work to be discussed concerns primarily the cat and the macaque monkey, for the visual organization of the former is best understood, and the visual organization of the latter is of greatest relevance to human vision. Related observations made on other species are mentioned in passing. (Author)

A80-45025 **Pilots who drink - FAA regulations and policy, and the Air Line Pilots Association treatment program.** E. D. Weed, III. *Journal of Air Law and Commerce,* vol. 45, Summer 1980, p. 1089-1114. 102 refs.

Pilot alcoholism is discussed along with the methods of coping with the problem adopted by the CAB and the FAA: sanctions such as pecuniary penalties and revocation of certification are considered. Emphasis is placed on an alternative early identification and treatment plan; approved and supported by the FAA, which is currently being developed by the Air Line Pilots Association and involves the peer group approach and human intervention. J.P.B.

A80-45078 # **Standard man-machine procedure of optimal synthesis in computer-aided design systems. II (Tipovi choveko-mashinni protseduri na optimalniia sintez v sistemite za avtomatizirano proektirane. II).** D. D. Burev (B'lgarska Akademiia na Naukite, Institut po Tekhnicheska Kibernetika i Robotika, Sofia, Bulgaria). *Problemi na Tekhnicheskata Kibernetika,* vol. 9, 1980, p. 3-14. 5 refs. In Bulgarian.

Standard man-machine procedures are described for four classes of optimal synthesis in CAD systems. Consideration is given to question of systems design under off-line conditions of operation. B.J.

A80-45092 # **The effect of the temperatures of different skin layers on the activity of cold thermoreceptors (Vliianie temperatury razlichnykh sloev kozhi na impul'satsiiu kholodovykh termoretseptorov).** V. A. Konstantinov, N. K. Danilova, and K. P. Ivanov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 66, June 1980, p. 902-907. 8 refs. In Russian.

The responses of skin thermoreceptors to variations in skin surface and interior layer temperatures are investigated. Rabbit upper lip and nose skin surfaces were cycled repeatedly between 22 and 40 C, and skin temperatures at depths of 0.1-0.2 and 2.55 mm and the activities of 16 individual cold thermoreceptors were monitored. The 18 C variations in surface temperature are found to cause variations of only 4.5 C in the temperature of the lower layers, with a time delay of 5-7 min. The firings of nine of the thermoreceptors are found to vary as skin surface temperature changed, while the remaining seven exhibited a pattern related to deep skin layer temperatures, demonstrating the existence of thermoreceptors at various depths within the skin. It is suggested that such a distribution allows the organism to assess the direction and intensity of heat flow through the skin. A.L.W.

A80-45093 # **The role of the hypoxic factor at elevated temperatures and possible mechanisms of its development (Rol' gipoksicheskogo faktora pri povyshennoi temperature i vozmozhnye mekhanizmy ego razvitiia).** L. V. Ngi and Iu. Iu. Keerig (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 66, June 1980, p. 908-913. 20 refs. In Russian.

Biochemical indicators of hypoxia are examined at elevated temperatures and conditions of decreased and increased humidity, and mechanisms for the development of hypoxia in response to elevated temperatures are discussed. The blood pH and blood levels of CO2, buffer bases, bicarbonate, lactic acid and pyruvic acid of rabbits exposed to a simulated altitude of 5000 m at 20-22 C are found to be identical with those of rabbits exposed to a temperature of 44-45 C at low relative humidity, while those of rabbits kept at the same temperature and a humidity from 90-95% exhibit even greater differences from initial values. Of the factors suggested to be responsible for the observed hypoxia accompanying hyperthermia, it is argued that the reduced partial oxygen pressure of alveolar air and the shift of the hemoglobin dissociation curve can be only of small importance, and that hypoxia of mixed type can be induced by a redistribution of blood and changes in the activity of certain respiratory enzymes. A.L.W.

A80-45273 **Accuracy of visual estimate of the remoteness of an object in a space having no optical reference.** V. I. Kushpil' and E. K. Veselova. *(Optiko-Mekhanicheskaia Promyshlennost',* vol. 46, Dec. 1979, p. 54.) *Soviet Journal of Optical Technology,* vol. 46, Dec. 1979, p. 752, 753. Translation.

The question of the possibilities of estimating the remoteness of a point light source in a space having no optical reference is examined. The results of an experiment in which observers place a point light source at a specified distance are presented. The results obtained are compared with the data of a direct estimate of remoteness in meters. (Author)

A80-45623 **Low frequency asymptotics for a hydroelastic model of the cochlea.** M. H. Holmes (Rensselaer Polytechnic Institute, Troy, N.Y.). *SIAM Journal on Applied Mathematics,* vol. 38, June 1980, p. 445-456. 8 refs.

A three dimensional hydroelastic model of the cochlea is analyzed, where the fluid motion is described using the linearized Navier-Stokes equations and the basilar membrane is modeled as an elastic plate. By expanding in terms of the width to length ratio it is found that to first order there is Poiseuille flow down the cochlea and the plate reduces to a massless beam in the transverse direction. After this the solution is found for a particular geometry and comparison is made with experiment. (Author)

A80-45676 Symposium on Theory and Practice of Robots and Manipulators, 3rd, Udine, Italy, September 12-15, 1978, Proceedings. Symposium sponsored by the Centre International des Sciences Mécaniques and International Federation for the Theory of Machines and Mechanisms. Edited by A. Morecki (Warszawa, Politechnika, Warsaw, Poland), G. Bianchi (Milano, Politecnico, Milan, Italy), and K. Kedzior. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1980. 613 p. $123.

The symposium focused on the mechanics and biomechanics of motion, the synthesis and design of robots and manipulators, motion control, sensors and artificial intelligence, man-machine systems, and applications. Papers are presented on the optimization of manipulator performance and actuation by interactive computing, the dimensional synthesis of manipulators, the decoupled feedback control of robot and manipulator arms, and the manipulation of large objects. Other papers include the optimal manipulator control on the basis of actual information on movement limitation, a microprocessor-based telemanipulator system, and the adaptive control of technological industrial robots for welding. V.L.

A80-45680 # On the grasping process for objects of irregular shape. G. Bianchi and A. Rovetta (Milano, Politecnico, Milan, Italy). In: Symposium on Theory and Practice of Robots and Manipulators, 3rd, Udine, Italy, September 12-15, 1978, Proceedings. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1980, p. 67-86. Research supported by the Consiglio Nazionale delle Ricerche.

A limitation in the efficient use of manipulators is often found in the difficulty of designing a mechanical hand capable of safely handling objects of different shapes. With the aim of developing models of multipurpose extremities, a hand with two fingers and a palm was designed (Rovetta, 1977; Rovetta and Casarico, 1978; Rovetta, 1980). This paper describes a first step in the analysis of the prehension process of an object of irregular shape. The motion of the object relative to the fingers and the palm is studied during the grasping process. (Author)

A80-45682 # Application of bond graphs to the synthesis and analysis of telechirics and robots. J. E. E. Sharpe (Queen Mary College, London, England). In: Symposium on Theory and Practice of Robots and Manipulators, 3rd, Udine, Italy, September 12-15, 1978, Proceedings. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1980, p. 217-227.

A80-45687 * # Manipulation of large objects. A. K. Bejczy (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Symposium on Theory and Practice of Robots and Manipulators, 3rd, Udine, Italy, September 12-15, 1978, Proceedings. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1980, p. 301-322. 7 refs. Contract No. NAS7-100.

Remote manipulator control experiments have been conducted to investigate the problems related to the 'controlled collision' aspect of manipulation. A six degrees of freedom pantograph arm with a six-dimensional force-torque balance sensor and microprocessor-driven real-time graphics display are employed in the experiments. Among other results, it is found that the use of computer force-torque feedback loop for 'stop at contact' provides a nearly linear relation between load transfer to jigs at 'stop at contact', rate of motion, and preset force-torque threshold values for stop under limited motion and load conditions. V.L.

A80-45691 # A contribution to the biomechanics of master-slave manipulators. K. V. Frolov and A. E. Kobrinskii (Akademiia Nauk SSSR, Institut Mashinovedeniia, Moscow, USSR). In: Symposium on Theory and Practice of Robots and Manipulators, 3rd, Udine, Italy, September 12-15, 1978, Proceedings. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1980, p. 461-475.

The paper deals with the results of the analysis of a method to control manipulators that is based on the admission of arbitrary divergence between the positions of the master and slave arms. This method assures a considerable gain in the slave arms' working zone yet the system feature that is usually referred to as mnemonicity suffers a decrease. An attempt has been made to suggest quantitative estimates for the mnemonicity of duplication systems and for the hand control systems performance. (Author)

A80-45693 # Adaptive control of technological industrial robots for welding. G. A. Spynu, V. T. Antonenko, and V. G. Timoshenko (Akademiia Nauk Ukrainskoi SSR, Institut Elektrosvarki, Kiev, Ukrainian SSR). In: Symposium on Theory and Practice of Robots and Manipulators, 3rd, Udine, Italy, September 12-15, 1978, Proceedings. Amsterdam, Elsevier Scientific Publishing Co.; Warsaw, PWN-Polish Scientific Publishers, 1980, p. 554-568.

A80-45752 # Cost effectiveness modeling for a total training system. J. R. Milligan and R. J. Strohl (Rockwell International, North American Aircraft Div., Columbus, Ohio). *American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif., Aug. 4-6, 1980, Paper 80-1894.* 9 p. 5 refs.

The Training System Cost Effectiveness (TSCE) Model enables many disciplines to assist in quantifying the critical relationship between system cost and effectiveness. In the TSCE model, trainer aircraft requirements and their relationship to other training media are defined using an expansion of the instructional system development process. In addition, the Model is designed to determine the influence of terminal learning objectives on combinations of people, support equipment, and training media. The result is a highly flexible model which can be used by decision makers to iteratively examine many alternatives and select a final system which best meets their needs. (Author)

A80-45974 Plasma AVP, neurophysin, renin activity, and aldosterone during submaximal exercise performed until exhaustion in trained and untrained men. B. Melin, J. P. Eclache, G. Geelen, G. Annat, A. M. Allevard, E. Jarsaillon, A. Zebidi, J. J. Legros, and C. Gharib (Lyon I, Université, Lyons, France). *European Journal of Applied Physiology,* vol. 44, Aug. 1980, p. 141-151. 39 refs. Research supported by the Université de Lyon; Délégation Générale à la Recherche Scientifique et Technique Contract No. 77-7-0823.

A80-45975 The influence of temperature on the amplitude and frequency components of the EMG during brief and sustained isometric contractions. J. S. Petrofsky (Wright State University, Dayton, Ohio) and A. R. Lind (St. Louis University, St. Louis, Mo.). *European Journal of Applied Physiology,* vol. 44, Aug. 1980, p. 189-200. 34 refs. Grant No. AF-AFOSR-76-3084; Contract No. F33615-78-C-0501.

The influence of temperature on the amplitude and frequency components of the EMG power spectra of the surface EMG recorded over the forearm muscles was examined in five male and five female subjects during brief and fatiguing isometric contractions of their handgrip muscles. Brief (3 s) isometric contractions were exerted at tensions ranging between 10 and 100% of each subject's maximum strength while fatiguing contractions were exerted at tensions of 25, 40, and 70% of their maximum strength. The temperature of the muscles during those contractions was varied by placing the forearms

of the subjects in a controlled temperature water bath at temperatures of 10, 20, 30, and 40 C. The results of these experiments showed that the center frequency of the power spectra of the surface EMG was directly related to the temperature of the exercising muscles during brief isometric contractions. During fatiguing isometric contractions, the amplitude of the EMG increased while the center frequency of the EMG power spectra decreased for all tensions examined. (Author)

A80-46196 * Extremes of urine osmolality - Lack of effect on red blood cell survival. H. A. Leon and J. E. Fleming (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *American Journal of Physiology*, vol. 239, July 1980, p. C27-C31. 13 refs.

Rats were allowed a third of normal water intake for 20 days, and food consumption decreased. The reticulocyte count indicated a suppression of erythropoiesis. Urine osmolality increased from 2,000 mosmol/kg to 3,390 mosmol/kg. Random hemolysis and senescence of a cohort of red blood cell (RBC) previously labeled with (2-(C-14)) glycine was monitored via the production of (C-14)O. Neither hemolysis nor senescence was affected. Following water restriction, the polydipsic rats generated a hypotonic urine. Urine osmolality decreased to 1,300 mosmol/kg for at least 6 days; a reticulocytosis occurred, but RBC survival was unaffected. These results contradict those previously reported, which suggest that RBC survival is influenced by the osmotic stress imposed on the RBC by extremes of urine tonicity. This discrepancy, it is concluded, is due to differences in the methods employed for measuring RBC survival. The random-labeling technique employed previously assumes a steady state between RBC production and destruction. The cohort-labeling technique used here measures hemolysis and senescence independent of changes in RBC production, which is known to be depressed by fasting. (Author)

A80-46378 # Controlled ecological life support systems /CELSS/ and space habitats, anthropology, and psychology. T. S. Cheston (Georgetown University, Washington, D.C.). In: Space manufacturing III; Proceedings of the Fourth Conference, Princeton, N.J., May 14-17, 1979. New York, American Institute of Aeronautics and Astronautics, Inc., 1979, p. 25-29.

Controlled ecological life support systems (CELSS) and the social, anthropological and psychological aspects of life in a space habitat are discussed. The results of studies indicating the value of a ground-based CELSS experiment and further research required in CELSS development are presented, and the relation of nutrition, diet and food processing in space to CELSS are discussed, with attention also given to instances of controlled environmental agriculture on earth and the waste treatment options and requirements for a closed system. Design considerations for a zero-gravity environment are examined in light of social interactions and human needs and the problems of children's growth in a permanent settlement. Consideration is then given to the benefits of including anthropology in the development of space settlements, consciousness alterations in space such as those undergone by various Apollo and Skylab astronauts, and the legal background and responsibilities of governments in space. A.L.W.

A80-46392 # Nutrition, diet and food processing in controlled environment life support systems. J. P. Clark (ITT Continental Baking Co., Rye, N.Y.). In: Space manufacturing III; Proceedings of the Fourth Conference, Princeton, N.J., May 14-17, 1979. New York, American Institute of Aeronautics and Astronautics, Inc., 1979, p. 371-373; Discussion, p. 373, 374.

The status and research requirements for the nutrition, diet and food processing components of a controlled environment life support system have recently been evaluated. The nutritional requirements for man, even in space, can be specified in terms of chemical composition rather than traditional foods. The dietary requirements are less well-known in terms of acceptability, variability and other psychological factors. Food processing requirements refer both to preservation of stored foods and processing of recycled nutrients. There are novel constraints imposed by space conditions and by various potential raw materials. The key need is for efficient means of providing the organoleptic characteristics found necessary for an acceptable and nutritional diet. (Author)

A80-46393 # Agriculture and food production. J. M. Phillips (Arizona Research Associates, Inc., Tucson, Ariz.). In: Space manufacturing III; Proceedings of the Fourth Conference, Princeton, N.J., May 14-17, 1979. New York, American Institute of Aeronautics and Astronautics, Inc., 1979, p. 375-380. 16 refs.

The development of agriculture and food production systems for controlled ecological life support systems (CELSS) such as would be necessary in large space habitats is discussed. The adoption of a conservative strategy for supplying human dietary requirements, which would imply a diet composed of traditional food sources in sufficient diversity and abundance, is discussed, and implications of this strategy for the potential crop, livestock and aquatic components and biomass flow of a CELSS food production system are considered. The influence of CELSS for large space habitats on the coevolution of humans and agricultural and livestock species is argued to be a factor necessitating the maintenance of comprehensive selection criteria for potential biological components of CELSS. Finally, areas of further study on the ground and in the space environment are recommended and the terrestrial benefits and applications of the development of food production systems for CELSS in space habitats are indicated. A.L.W.

A80-46398 # Design opportunities - Zero gravity versus one gravity environments. C. A. O'Donnell (M. Rosenblatt and Son, Inc., Arlington, Va.). In: Space manufacturing III; Proceedings of the Fourth Conference, Princeton, N.J., May 14-17, 1979. New York, American Institute of Aeronautics and Astronautics, Inc., 1979, p. 505-507, Discussion, p. 507-508.

The weightless environment produces physical changes in man, alters his modes of perception, and presents a new interface with his physical surroundings. These changes suggest that the eventual shape and form of habitat interiors will differ from many present concepts. This paper presents selected examples of physical and perceptual changes in zero gravity and raises issues which must be incorporated into the design process to provide space habitats which will meet man's new needs in a changed environment. It also suggests that methods must be developed to measure the qualitative effects of design on persons in confined environments. (Author)

A80-46549 A rule-based model of human problem solving performance in fault diagnosis tasks. W. B. Rouse, S. J. Pellegrino (McDonnell Douglas Automation Co., St. Louis, Mo.), and S. H. Rouse. *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, July 1980, p. 366-376. 22 refs. Grant No. DAHC19-78-G-0011; Contract No. MDA903-79-C-0421.

The paper considers the modeling of human fault diagnosis behavior in terms of sequences of tests selected. A rule-based model was proposed and evaluated in the context of fault diagnosis tasks: one task included data for 118 subjects and the second task had 36 subjects. It was shown that the model chose tests similar to those of the human 94% and 88% of the time, respectively. Considering the model's ability to choose the same tests as subjects, the comparison between model and subjects was not good, resulting in only a 52% agreement for the first task. However, such a result is expected when subjects are placed in a situation where they must choose between two or more equally attractive alternatives. It was concluded that the fairly favorable results presented in terms of similar tests should be interpreted as meaning that the model and subjects used the same rule in the same situation over 90% of the time. A.T.

A80-46550 Use of active compliance in the control of legged vehicles. C. A. Klein (Ohio State University, Columbus, Ohio)

and R. L. Briggs (MIT, Lexington, Mass.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, July 1980, p. 393-400. 29 refs. NSF Grant No. ENG-78-18957.

Often it is desirable to specify both position and force at the end effector of a manipulator system; however, when the system forms a closed kinematic chain both cannot be realized independently. Active compliance is a trade-off method that can be easily incorporated into the supervisory control philosophy which is often used to control complex man-machine system. An example of such a system is the Ohio State University (OSU) Hexapod which is a legged walking vehicle. Active compliance is shown to be invaluable for allowing legged locomotion over irregular terrain. (Author)

A80-46804 # **Results of the experiment 'Microorganism growth' on the Soyuz-22 spacecraft (Rezul'taty eksperimenta 'Rost mikroorganizmov' na kosmicheskom korable 'Soiuz-22').** V. A. Kordium, L. V. Polivoda, V. G. Man'ko, V. G. Babskii, N. I. Kon'shin, T. G. Gavrish, L. P. Polishchuk, and A. L. Mashinskii. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 3-14. 13 refs. In Russian.

Results of the Soyuz-22 experiment concerning the effects of the space environment on the growth of the bacterium Proteus vulgaris are presented. Following growth under anaerobic conditions in a ROST-3 growth chamber, bacteria innoculated onto a growth medium under space conditions were observed to be inhibited in growth relative to ground-based laboratory and transported controls, with the experimental cultures containing fewer and smaller cells. Chemotaxis investigations have shown the experimental cells to be less responsive to the products of their own metabolism than controls, while exhibiting inhibited colony growth on solid media with varying agar concentrations. It is noted that the differences found in the present experiment were more pronounced than decreases in viability and growth rate observed in previous experiments on board Soyuz-16 and Soyuz-19. A.L.W.

A80-46805 # **The ultrastructure of Proteus vulgaris cells grown in orbit on board the Soyuz-22 spacecraft (Ul'trastruktura kletok Proteus vulgaris, vyrosshikh v orbital'nom polete na bortu kosmicheskogo korablia 'Soiuz-22').** O. P. Bochagova, N. I. Kon'shin, E. L. Kordium, and A. F. Popova. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 14-20. In Russian.

Results of an electron microscopic analysis of the ultrastructure of cells of the bacterium Proteus vulgaris grown under anaerobic conditions in orbit on board Soyuz-22 and in the laboratory are presented. Four types of bacterial cell are observed, corresponding to cell types I, III, IV and VI, which are characterized by varying amounts of regions of electron-transparent deposits of easily dissolved formazan, fibrillar-granular formations and membrane structures. In addition, a number of other cell types was observed, all without formazan deposits but with a great extent of internal lysis. The ultrastructures of the experimental and control cells are found to be similar in many ways, exhibiting signs of premature aging due to the experimental manipulation. Ultrastructural observations are also found to be in agreement with the observed growth patterns of the cells, with the presence of formazan deposits in 3% of the experimental cells, 6.8% of the laboratory controls and 1.5% of the transported controls, and the laboratory controls remaining in the best condition. A.L.W.

A80-46806 # **The survival rate of various species of dark-colored mushrooms under the influence of artificial solar radiation (Vyzhivaemost' nekotorykh vidov temnookrashennykh gribov pod vliianiem iskusstvennogo solnechnogo izlucheniia).** N. N. Zhdanova, A. N. Liulichev, A. I. Vasilevskaia, and A. L. Antonenko. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 20-24. 18 refs. In Russian.

The resistance of several species of melanin-containing mushrooms to artificial solar radiation is investigated in light of their demonstrated resistance to UV radiation prevalent in the space environment. Specimens of the UV-resistant mushrooms Stemphylium ilicis, S. sarciniforme and Cladosporium transchelii and certain of its mutations with defects in melaninogenesis were irradiated by a simulated solar radiation with 10-12% of its energy in the UV at levels of up to 700 J/sq m sec in air and 1400 J/sq m sec in vacuum. Results obtained in air are found to be similar to those in vacuum, and indicate that resistance to damage induced by solar radiation is dependent on melanin content in the cellular envelope of the mushrooms studied. A.L.W.

A80-46807 # **The effect of space flight factors on the characteristics of nutrient media for the bacterium Proteus vulgaris (Vliianie faktorov kosmicheskogo poleta na kharakteristiki pitatel'noi sredy dlia bakterii Proteus vulgaris).** V. G. Babskii, V. G. Man'ko, L. V. Polivoda, A. A. S'edin, and V. A. Kordium. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 24-30. 18 refs. In Russian.

The effects of the space flight environment on the physicochemical and biological properties of the weak gel of nutrient agar used to support cultures of the bacterium Proteus vulgaris during space experiments are investigated. The bacterial growth properties, viscosity and sedimentation characteristics of the indicator-containing nutrient medium used in space-borne microorganism growth experiments were measured for samples flown on Soyuz 20 for a period of three months and laboratory and transported controls. It is found that the transport of the medium to the launch facility and space flight conditions lead to a significant decrease in the mechanical strength of the agar gel, accompanied even in the laboratory samples by a decrease in its capacity to support bacterial growth and mobility. A.L.W.

A80-46809 # **The effect of space flight conditions on higher plant cells in vitro culture (Vliianie uslovii kosmicheskogo poleta na kletki vysshikh rastenii v kul'ture in vitro).** P. G. Sidorenko and A. L. Mashinskii. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 39-42. 5 refs. In Russian.

The effects of space flight conditions on the growth, reproduction and several structural and function characteristics of tissue cultures of the higher plant Haplopappus gracilis are investigated. For cultures grown on a solid agar medium on board the Soyuz-22 spacecraft for nine days, optical and electron microscopic analysis indicates that the growth of the culture was slowed relative to control cultures, with a disruption of tissue structure evidently due to in-flight vibrations. No substantial differences were found between the nature of growth, the formation of reproductive cells, mitosis frequencies, nuclear dimensions and population karyotypes in experimental and control cultures kept at 18 C, although controls grown at the optimum temperature of 26 C exhibited a larger increase in biomass. A.L.W.

A80-46810 # **The effects of orbital flight conditions on the formation of the generative organs in Muscari racemosum and Anethum graveolens (Vliianie uslovii orbital'nogo poleta na formirovanie generativnykh organov Mussari racemosum i Anethum graveolens).** E. L. Kordium, A. L. Mashinskii, A. F. Popova, S. A. Uvarova, and L. A. Khristenko. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 42-49. In Russian.

The effects of orbital space flight conditions on the growth of the male gametophyte of the bulbous herb Muscari racemosum and on the formation of the generative organs of dill plants (Anethum graveolens) are investigated. The plants were grown from seeds carried on board the Soyuz-20 spacecraft during the course of its three-month flight beginning in November, 1975, and compared with laboratory controls and plants grown under natural conditions by means of optical microscopy. It is found that space flight conditions lead to an acceleration in the development of the male gametophyte of M. racemosum and a decrease in the germination rate and the percent of shoot formation in dill plants. However, the numbers of buds and leaves and the characteristics of the establishment of generative organs, sporo- and gametogenesis, male and female gametophyte development, fruiting and embryo- and endosperm-

genesis in the dill are observed to be basically similar to those of the controls. Finally, it is noted that the seeds produced by the experimental plants were similar in size and weight to those of the controls. A.L.W.

A80-46811 # Investigation of the effects of space flight factors on the emergence from the anabiotic state of turions of the great duckweed (Izuchenie vliianiia faktorov kosmicheskogo poleta na vykhod iz anabioticheskogo sostoianiia turinov spirodely mnogokorennoi). Iu. A. Kutlakhmedov, G. S. Sokirko, D. M. Grodzinskii, A. L. Mashinskii, G. S. Nechitailo, and N. I. Kon'shin. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 49-54. In Russian.

The effects of space flight conditions on the emergence of turions from the dormant state to a state of active growth is investigated in the great duckweed Spirodela polyrhiza. Specimens of dormant spirodela turions placed in IFS growth chambers on board the Soyuz-12 and 13 and Cosmos-656 spacecraft were activated under space flight conditions by the awakening factor kinetin, and subsequent growth was monitored by tritiated thymidine uptake and fascicle growth. The early stages of cell division in the meristem are found to be inhibited in experimental specimens relative to controls, accompanied by an irregular suppression of the function of the first daughter fascicle. It is concluded that the early stages of the awakening of the duckweed appear to be a sensitive and convenient model for the investigation of the effects of the space flight environment. A.L.W.

A80-46812 # The effects of simulated weightlessness on the reproductive capacity of the great duckweed in the norm and under irradiation (Vliianie simulirovannoi nevesomosti na reproduktivnuiu sposobnost' spirodely mnogokorennoi v norme i pri obluchenii). Iu. A. Kutlakhmedov, G. S. Sokirko, and D. M. Grodzinskii. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 55-58. 7 refs. In Russian.

The effects of weightlessness simulated on a clinostat on the generative capacity of meristem cells of the great duckweed are investigated for samples irradiated by various doses of Co-60 gamma radiation. Irradiated cells grown under simulated weightlessness are found to exhibit an increased number of descendants relative to meristems cultured under normal gravity, indicating an increase in radiation stability. Increased numbers of generations, descendents in each generation and generation rates are also observed for nonirradiated specimens in the clinostat relative to those grown under normal conditions. A.L.W.

A80-46813 # The effects of low-intensity magnetic fields on plant cell reproduction (Vliianie magnitnykh polei nizkoi napriazhennosti na reproduktsiiu kletok). V. M. Fomicheva, N. I. Bogatina, B. I. Verkin, V. M. Litvin, and N. B. Rudenko. *Kosmicheskie Issledovaniia na Ukraine,* no. 12, 1978, p. 58-62. 28 refs. In Russian.

The effects of magnetic fields on the order of 0.5 millioersted on the reproduction rate of cells of the seeds of the pea plant are investigated by means of autoradiography. Following a 24-h incubation of the seeds in an artificial magnetic field and control fields, autoradiographs were made of cells labeled by tritiated thymidine. Results indicate a 30% increase in the duration of the cell cycle for cells grown in a null magnetic field, which is due to the prolongation of the G1 (presynthetic) phase. In addition, in hypomagnetic conditions the size of the proliferative pool is decreased to 68% of the population, in contrast to the 96% of the population undergoing proliferation in control cells. Results thus demonstrate the sensitivity of the phase preceding DNA synthesis to environmental factors and the complexity of the system regulating cell proliferation. A.L.W.

A80-46961 # The axiomatic introduction of a metric in binocular visual space. I, II (Aksiomaticheskoe vvedenie metriki v binokuliarnom zritel'nom prostranstve. I, II). B. K. Lopatchenko. *Problemy Bioniki,* no. 23, 1979, p. 10-20. In Russian.

Consideration is given to the development of a mathematical model of the physical space revealed by binocular visual mechanisms. The black box method for investigating visual perception, in which the subject is regarded as an undetermined transformer of information (black box), is discussed, with attention given to the types of input-output tasks involved in such experiments, and it is noted that such experiments have indicated that in perception, binocular space is characterized by Lobachevskii geometry. A set of axioms is then derived based on the operations of equipartition and distance comparison for specifying the metric properties of visual space. It is noted that the axioms and definitions presented are in agreement with experimental observations and can be used to obtain Hilbert's axioms describing three-dimensional space. A.L.W.

A80-46962 # The discreteness of auditory information (K voprosu o diskretnosti slukhovoi informatsii). S. A. Usenko. *Problemy Bioniki,* no. 23, 1979, p. 27-32. In Russian.

On the basis of psychoacoustic experiments, it is proposed that the quantity of information derivable by the human auditory apparatus from an audio oscillogram is finite and thus can be represented in discrete form. Consideration is given to the observed behavior of sensory systems as nonideal instruments, reacting only to sufficiently large changes in sensory input, and the limited temporal passband of acoustic information receivers. An analytic expression is derived for a discrete signal perceived as an analog signal, and an experimental transformer circuit used to verify the formulation, which is in accordance with Talbot's law is presented. It is pointed out that the discreteness of auditory information can be used as a basis for the development of an instrument for the analysis and synthesis of speech. A.L.W.

A80-46970 # Experimental investigations of binocular space perception (Eksperimental'nye issledovaniia binokuliarnogo vospriiatiia prostranstva). B. K. Lopatchenko and I. V. Shul'gin. *Problemy Bioniki,* no. 22, 1979, p. 17-24. 18 refs. In Russian.

Experimental investigations of binocular perception are reviewed in light of their applicability to the formulation of a mathematical model of space perception. Attention is given to the work of Helmholtz (1911) and Blumenfeld (1913), which demonstrated that a line perceived as straight in the frontal plane is in reality curved, the experiments of Ames (1951, 1957) on the perception of distorted rooms, the theoretical work of Luneburg which concluded that visual space was not Euclidian but Riemannian with constant negative curvature, and the subsequent work of Blank, (1958), von Schelling (1960), Faley (1964), Buzeman (1962), and Ziman (1970) which developed Luneburg's ideas. In addition, the conclusions of Zajaczkowska (1956) and Kienle (1963) which point out some of the difficulties of the Luneburg theory of a hyperbolic space projected on a Euclidian space are indicated. A.L.W.

A80-46972 # An information processing mechanism for systems with boundary contrast and some optical illusions (Mekhanizm obrabotki informatsii v sistemakh s kraevym kontrastom i nekotorye zritel'nye illiuzii). G. V. Aleshin and V. A. Grabina. *Problemy Bioniki,* no. 22, 1979, p. 60-65. In Russian.

Mechanisms for enhancing the contrast of contours are discussed and the implications of these mechanisms for certain optical illusions encountered in observational tasks are examined. Expressions for contrast enhancement for a linear receptor field are presented, and it is pointed out that the increase in brightness observed at the light side of a boundary is equal to the brightness drop observed at the dark edge. Conditions for the perception of a widening of the white field of the contrasting system at the expense of the darker field are also obtained and shown to account for the well-known square illusion, the Mueller-Lyer illusion and illusions of radiating lines by retinal mechanisms. A.L.W.

A80-47021 * Characterization of renal response to prolonged immersion in normal man. M. Epstein, A. G. DeNunzio, and M. Ramachandran (U.S. Veterans Administration, Medical Center; Miami, University, Miami, Fla.). *Journal of Applied Physiology:*

Respiratory, Environmental and Exercise Physiology, vol. 49, Aug. 1980, p. 184-188. 21 refs. Research supported by the U.S. Veterans Administration; Contract No. NAS9-15473.

During the initial phase of space flight, there is a translocation of fluid from the lower parts of the body to the central vascular compartment with a resultant natriuresis, diuresis, and weight loss. Because water immersion is regarded as an appropriate model for studying the redistribution of fluid that occurs in weightlessness, an immersion study of relatively prolonged duration was carried out in order to characterize the temporal profile of the renal adaptation to central hypervolemia. Twelve normal male subjects underwent an immersion study of 8-h duration in the sodium-replete state. Immersion resulted in marked natriuresis and diuresis which were sustained throughout the immersion period. The failure of that natriuresis and diuresis of immersion to abate or cease despite marked extracellular fluid volume contraction as evidenced by a mean weight loss of -2.2 + or - 0.3 kg suggests that central blood volume was not restored to normal and that some degree of central hypervolemia probably persisted. (Author)

A80-47022 Cerebrovascular permeability to sucrose in the rat exposed to 2,450-MHz microwaves. E. Preston and G. Préfontaine (National Research Council, Div. of Biological Sciences, Ottawa, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, Aug. 1980, p. 218-223. 15 refs.

A80-47023 Plasma testosterone during treadmill exercise. J. E. Wilkerson, S. M. Horvath, and B. Gutin (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, Aug. 1980, p. 249-253. 18 refs. Grant No. AF-AFOSR-78-3534.

Five male volunteers performed 20 min of steady-state submaximal exercise on a motor-driven treadmill at five intensities (30, 45, 60, 75, and 90% maximal aerobic capacity) as well as several maximal aerobic capacity tests. Peripheral venous plasma testosterone concentrations increased above resting values in proportion to exercise intensity. However, this increase in plasma testosterone concentration was virtually equal in magnitude to the decrease in plasma volume observed consequent to the exercise bouts, resulting in no change in total testosterone contents. There was an unexpected anticipatory elevation in resting preexercise control testosterone concentration and content with increasing work intensity. The possibility that testosterone has a direct role in the organism's response to whole-body exercise is questioned. (Author)

A80-47024 Physiological responses of physically fit men and women to acclimation to humid heat. B. A. Avellini, E. Kamon, and J. T. Krajewski (Pennsylvania State University, University Park, Pa.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, Aug. 1980, p. 254-261. 23 refs.

A80-47025 Work capacity during 3-wk sojourn at 4,300 m - Effects of relative polycythemia. D. Horstman, R. Weiskopf, and R. E. Jackson (U.S. Army Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, Aug. 1980, p. 311-318. 29 refs.

The effects of a three-week exposure to an altitude of 4300 m on physiological work capacity are investigated, with particular emphasis on the contribution of high-altitude polycythemia. Nine healthy male subjects were tested for maximal exercise capacity and endurance at sea level, during a three-week sojourn at 4300 m and following the subsequent removal of 450 ml of whole blood from five of the subjects. Following two weeks at altitude, maximal O2 consumption and systemic O2 transport are observed to increase 10%, the latter of which is due to a 19% increase in arterial O2 content despite a 9% decrease in maximal cardial output. The increased arterial O2 content in turn is found to be a result of a 12% increase in O2 carrying capacity and a 6% increase in arterial O2 saturation, while decreased cardiac output is attributed to a 9% decrease in maximal stroke volume. Following blood removal, reductions of 8 and 7% in maximal O2 consumption and systemic O2 transport respectively are obtained, accompanied by decreases in arterial O2 content and capacity and increases in cardiac output and stroke volume. Results indicate that the effects of increased carrying capacity exceed those of reduced cardiac output, resulting in increased work capacity to which relative polycythemia is a major contributor. A.L.W.

A80-47064 # Thermal response model of a simulated cranial structure exposed to radiofrequency radiation. J. G. Burr, D. K. Cohoon, E. L. Bell, and J. W. Penn (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *IEEE Transactions on Biomedical Engineering,* vol. BME-27, Aug. 1980, p. 452-460. 21 refs.

A thermal response model of a simulated cranial structure (multilayered sphere) exposed to radiofrequency radiation (RFR) has been developed and experimentally verified for the no blood flow case. The thermal response model considers the RFR energy absorption distribution as predicted through use of the Mie theory, the thermal properties of the many layers, the blood flow to the central core area, and surface cooling through the application of a nonhomogeneous Newton cooling law. The model was preliminarily verified using homogeneous muscle equivalent spheres and an electrothermia monitor. (Author)

A80-47065 Theoretical analysis of error during signal averaging for detection of His-bundle activity. J. E. Ribeiro, A. G. Neto, N. G. Wiederehecker, A. F. C. Infantosi (Rio de Janeiro, Universidade Federal, Rio de Janeiro, Brazil), and A. Caprihan (Lovelace Medical Center, Albuquerque, N. Mex.). *IEEE Transactions on Biomedical Engineering,* vol. BME-27, Aug. 1980, p. 473-476. 5 refs.

Errors associated with the use of coherent signal averaging in synchronism with the ECG R wave to detect His-bundle activity are analyzed. A model of signal averaging is developed in order to investigate the effects of the sampling interval, periodic noise, quantization error and trigger detection for an information signal occuring up to 40 msec before the QRS complex at an amplitude from 0.001 to 0.01 times that of the QRS complex. It is found that 60-Hz interference muscular noise and quantization error all behave as white noise, an accurate detection of the R wave is necessary, and that quantization error is negligible for 8 bits of quantization. A.L.W.

Page Intentionally Left Blank

STAR ENTRIES

N80-28812*# Jet Propulsion Lab.; California Inst. of Tech., Pasadena.

A VERY LONG BASELINE INTERFEROMETRY SKY SURVEY

Robert A. Preston and D. D. Morabito *In* NASA. Goddard Space Flight Center Radio Interferometry Jul. 1980 p 173-179 refs

(Contract NAS7-100)

Avail: NTIS HC A20/MF A01 CSCL 08E

A systematic very long baseline interferometry (VLBI) sky survey, undertaken to find a suitable set of compact celestial radio sources from which a more complete VLBI reference frame can be constructed, discussed. The survey was conducted by searching known celestial radio sources for compact components by means of VLBI observations. Baseline lengths were about 7 x 10 to the 7th power RF wavelengths (lambda = 13.1 cm), so the spatial wavelengths being sampled by the interferometer were generally on the order of a few milliarcseconds. Hence, the radio sources detected have a measurable portion of their total flux density contained in components that are no more than a few milliarcseconds in angular extent. Existing information of radio sources were used as clues to source size. E.D.K.

N80-29010*# National Aeronautics and Space Administration, Washington, D. C.

ELECTROENCEPHALOGRAPHIC CHANGES IN ALBINO RATS SUBJECTED TO STRESS

J. Mercier, G. Assouline, and J. Fondarai Apr. 1980 8 p ref Transl. into ENGLISH from OMPT Rend. Soc. Biol. (France), v. 161, no. 7, Jun. 1967 p 1639-1641 Presented at Marseilles Biol. Soc. Meeting, 20 Jun. 1967 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Med. and Pharm. Fac. of Marseilles

(Contract NASw-3199)

(NASA-TM-76118) Avail: NTIS HC A02/MF A01 CSCL 06C

Twenty one albino Wistar rats were subjected to stress for 7 hours. There was a significant difference in the slopes of regression lines for 7 nonulcerous rats and those for 14 ulcerous rats. Nonulcerous rats subjected to stress showed greater EEG curve synchronization than did ulcerous rats. If curve synchronization can be equated to a relaxed state, it may therefore be possible to explain the protective action of hypnotics, tranquilizers and analgesics on ulcers. Author

N80-29011*# Miami Univ., Coral Gables, Fla. Inst. for Molecular and Cellular Evolution.

FROM INANIMATE MATTER TO LIVING SYSTEMS

Sidney W. Fox 27 May 1980 33 p refs

(Grant NGR-10-007-008)

(NASA-CR-163372) Avail: NTIS HC A03/MF A01 CSCL 06C

Since the early part of this century, the Genesis account of the origin and evolution of life has been explained as an extrapolation of astronomical and geochemical processes. The essence of the answer to date is a protoreproductive protocell of much biochemical and cytophysical competance. The processes of its origin, molecular ordering, and its functions are described. A crucial understanding is that of the nonrandomness of evolutionary processes at all stages (with perhaps a minor statistical component). In this way, evolution conflicts with statistical randomness; the latter is a favorite assumption of both scientific and creationistic critics of the proteinoid theory. The principle contribution of the proteinoid theory to the understanding of general biology is to particularize the view that evolutionary direction is rooted in the shapes of molecules, in stereochemistry. After molecules of the right kind first assembled to protocells, life in its various stages of evolution was an inevitable consequence. It is molecules that continue to assemble as part of living process and, in the role of enzymes, continue to direct life cycle of the cell. A.R.H.

N80-29012*# National Aeronautics and Space Administration, Washington, D. C.

THE EFFECT OF HYPODYNAMIA ON THE STRUCTURE OF THE INTRAORGANIC BLOOD VESSELS AND THE CAPACITY OF THE BLOOD STREAM IN THE DIAPHRAGM OF WHITE RATS

A. I. Gerus May 1980 11 p refs Transl. into ENGLISH from Vestsi Akad. Navuk BSSR, Ser. Biyal. Navuk (USSR), no. 3, 1974 p 94-98 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3198)

(NASA-TM-76140) Avail: NTIS HC A02/MF A01 CSCL 06C

The effect of hypodynamia on the vascular system of white rats with diaphragm deprivation was investigated. Morphological changes in the intraorganic blood stream of the diaphragm were determined. The capacity of the intraorganic vascular flow within the diaphragm muscles was established. R.E.S.

N80-29013*# National Aeronautics and Space Administration, Washington, D. C.

GENETIC CHANGES INDUCED BY SPACE FLIGHT FACTORS IN BARLEY SEEDS ON SOYUZ-5 AND SOYUZ-9 CRAFT

N. I. Nuzhdin and R. L. Dozortseva Jul. 1980 17 p refs Transl. into ENGLISH from Zh. Obshch. Biol. (USSR), v. 33, no. 2, 1972 p 336-346 Translation was announced as N70-23662 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3198)

(NASA-TM-76281) Avail: NTIS HC A02/MF A01 CSCL 06C

Air-dry seeds of the barley Zimujuschij moscowskyi of the 1969 harvest were taken into space onboard the spaceships Soyuz-5 and Soyuz-9. A cytological study of the mitoses in meristemic cells in rootlet terminals revealed that space flight factors (SFF) in nonirradiated seeds induced about 3% of aberrant cells. After irradiation the effect of SFF increased over two-fold. Although the radio protectors ensured the seeds against from the SFF-induced damage either in irradiated or nonirradiated seed cells which is inconsistent with the previously obtained data. L.F.M.

N80-29014*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

RESPONSE OF SELECTED PLANT AND INSECT SPECIES TO SIMULATED SOLID ROCKET EXHAUST MIXTURES AND TO EXHAUST COMPONENTS FROM SOLID ROCKET FUELS

William W. Heck (Department of Agriculture), William M. Knott, Edward P. Stahel (North Carolina State Univ.), John T. Ambrose (North Carolina State Univ.), James N. McCrimmon (North Carolina State Univ.), Madeleine Engle (North Carolina State Univ.), Louse A. Romanow (North Carolina State Univ.), Alan G. Sawyer (North Carolina State Univ.), and James D. Tyson (North Carolina State Univ.) Aug. 1980 158 p refs

(NASA-TM-74109; KSC-TR-51-1) Avail: NTIS HC A08/MF A01 CSCL 06C

The effects of solid rocket fuel (SRF) exhaust on selected plant and and insect species in the Merritt Island, Florida area was investigated in order to determine if the exhaust clouds generated by shuttle launches would adversely affect the native, plants of the Merritt Island Wildlife Refuge, the citrus production, or the beekeeping industry of the island. Conditions were simulated in greenhouse exposure chambers and field chambers constructed to model the ideal continuous stirred tank reactor. A plant exposure system was developed for dispensing and monitoring the two major chemicals in SRF exhaust, HCl and Al2O3, and for dispensing and monitoring SRF exhaust (controlled fuel burns).

Plants native to Merritt Island, Florida were grown and used as test species. Dose-response relationships were determined for short term exposures of selected plant species to HCl, Al203, and mixtures of the two to SRF exhaust. R.E.S.

N80-29015*# National Aeronautics and Space Administration, Washington, D. C.
ULCERS IN RESTRAINED RATS: STUDY OF PROTECTIVE SUBSTANCES
L. Buche and D. Gallaire May 1980 21 p refs Transl. into ENGLISH from Arch. Sci. Physiol. (France), v. 21, no. 4, 1967 p 537-552 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Pharmacology Inst.
(Contract NASw-3199)
(NASA-TM-76184) Avail: NTIS HC A02/MF A01 CSCL 06C

The genesis of ulcers in restrained rats is discussed through an investigation of the relationship between the protective effects of nervous system effectual substances examined vis-a-vis ulcers in restrained rats and their elective or secondary pharmacologic effects. The substances used were capable of either peripheral parasympatholytic, sympatholytic, ganglioplegic, spasmolytic effects or central, hypnotic, tranquilizing, neuroleptic, analgesic effects. The regular and considerable protection observed with parasympatholytics (atropine sulfate, benzylonium bromide, dihexyverine, J.L. 1344) and a ganglioplegic (pentamethonium) is a function of their anticholinergic properties. It is of less importance with dibenamine, a sympatholytic action on the adrenergic receptors. Among the central depressive substances tested (hypnotics, tranquilizers, neuroleptics, analgesic), phenobarbital at a nonhypnotic dose, and dextromoramide at a nonanalgesic dose, show antiulcerous effects, which are found with chlorpromazine only at cataleptogenic doses. M.G.

N80-29016*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF CERTAIN PSYCHOPHARMACOLOGICAL PREPARATIONS ON ADAPTATION UNDER STRESS CONDITIONS
A. V. Stanishevskaya and L. N. Mezentseva Jun. 1980 7 p refs Transl. into ENGLISH from Farakol. Toksikol. (USSR), v. 40, no. 1, 1977 p 9-12 Transl. by Scientific Translation Service, *Santa Barbara, Calif.*
(Contract NASw-3198)
(NASA-TM-76185) Avail: NTIS HC A02/MF A01 CSCL 06C

Experiments staged on rats demonstrated that the formation of pathological states caused by stress and accompanied by the development of ulcerative lesion of the gastric mucosa are associated with the degree of the catecholamines level drop in the mesencephalon and hypothalamus. The application of seduxen and also of combinations consisting of L-DOPA with seduxen, or with an L-adrenoblocking agent pyroxan tends to reduce the frequency of developing alcerative lesions of the stomach. The protective effect produced by the combination of L-DOPA with an L-adrenoblocking agent pyroxan is barred by an additional administration of an B-adrenoblocking agent, inderal. Author

N80-29017# Wyoming Univ., Laramie. Dept. of Zoology and Physiology.
PARAMECIUM TETRAURELIA: PRESCREEN FOR HAZARDOUS AGENTS
J. Smith-Sonneborn, C. Herr, and E. VanKirk 1979 37 p refs
(Contract DE-AC02-77EV-04477)
(DOE/EV-04477/1) Avail: NTIS HC A03/MF A01

The ciliated protozoan, paramecia, is proposed as a eukaryote model system for use in short term screening assays for detection of mutagenic/carcinogenic and hazardous agents. The approach utilizes two assays: the mutagenic and photodynamic systems. DOE

N80-29018# WIL Research Labs., Inc., Cincinnati, Ohio.
TERATOLOGIC EFFECTS OF LONG-TERM EXPOSURE TO DIESEL EXHAUST EMISSIONS (RATS) Progress Report, 15 Sep. 1978 - 7 Feb. 1979
Kathleen M. Werchowski, Vincent W. Chaffee, and G. Bruce Briggs Jan. 1980 41 p
(Contract EPA-68-03-2652)
(PB80-159965; EPA-600/1-80-010) Avail: NTIS HC A03/MF A01 CSCL 06T

The potential for diesel exhaust emissions to produce malformations in rat fetuses was investigated. The rats were exposed by the inhalation route to a 10% concentration of diesel exhaust emissions in inhalation chambers on days 6 through 15 of gestation. (Methods used conform to the guideline developed by the Food and Drug Administration for evaluating teratogenic effects in rats.) The results of the exposure of pregnant rats indicate that diesel exhaust emissions have no effect upon normal development of rat fetuses. Diesel exhaust emissions did not effect any of the parameters evaluated to assess maternal toxicity nor total number of fetuses born. GRA

N80-29019# WIL Research Labs., Inc., Cincinnati, Ohio.
TERATOLOGIC EFFECTS OF LONG-TERM EXPOSURE TO DIESEL EXHAUST EMISSION (RABBITS) Progress Report, 19 Dec. 1978 - 25 May 1979
Kathleen M. Werchowski, Stephen P. Henne, and G. Bruce Briggs Jan. 1980 49 p
(Contract EPA-68-03-2652)
(PB80-168529; EPA-600/1-80-011) Avail: NTIS HC A03/MF A01 CSCL 06T

The potential for diesel exhaust emissions to produce malformation in rabbit fetuses was evaluated. The pregnant does were exposed by the inhalation route to a 10% concentration of diesel exhaust emissions in inhalation chambers on days 6 through 18 of gestation (Methods used conform to the guideline developed by the Food and Drug Administration for evaluating teratogenic effects in rabbits.) The results of the exposure of pregnant rabbits indicate that diesel exhaust emissions have no effect upon the nornal development of rabbit fetuses. Diesel exhaust emission did not effect any of the parameters evaluated to assess maternal toxicity nor total number of fetuses born. GRA

N80-29020# Michigan State Univ., East Lansing. Inst. of Water Research.
AN EMPIRICAL STUDY OF FACTORS AFFECTING BLUE-GREEN VERSUS NONBLUE-GREEN ALGAL DOMINANCE IN LAKES *Project Completion Report*, 1 Oct. 1978 - 30 Sep. 1979
Kenneth H. Reckhow and Jonathan T. Simpson Feb. 1980 108 p refs
(Contract DI-14-34-0001-9024)
(PB80-169311; W80-04441; OWRT-A-102-MICH(3)) Avail: NTIS HC A06/MF A01 CSCL 06C

Exploratory data analysis techniques were applied to 90 north temperate lakes included in the EPA National Eutrophication Survey to examine empirical relationships between: (1) the chemical and physical variables that affect algal dominance in lakes; and (2) the dominant algal type. Single variable box plots and bivariate-discriminant plots document the importance of the inorganic nitrogen concentration and hydraulic detention time in determining blue-green versus nonblue-green algal dominance in *eutrophic lakes. The multivariate statistical technique of dis*criminant analysis was also applied to 68 high, alkalinity lakes in the data set to: (1) further identify variable relationships; and (2) construct a simple predictive model for algal dominance. GRA

N80-29022# National Electrical Engineering Research Inst., Pretoria (South Africa).
CHANGES IN THE QRS COMPLEX OF THE ELECTROCARDIOGRAM DURING SLEEP AND EXERCISE M.S. Thesis
The abrupt change in mean value, the beat by beat variability of the amplitudes and the gradual change of mean amplitude may assist the analysis of sleep. (4) The response of the QRS waveform to inspiration has two components, namely a step response caused by movement of the heart with the diaphragm, and a transient response possibly caused by ventricular volume changes. (5) The amplitudes of the R and S waves change in a defined pattern during exercise. (6) Changes of the R and S

Pretoria Univ.
John Nicholas Amoore May 1979 178 p refs
(CSIR-ELEK-167) Avail: NTIS HC A09/MF A01.

Changes in the QRS complex in normal healthy individuals during sleep were identified and studied in order to determine whether they are due to alteration in the cardiac signal or in the transfer function. A knowledge of the mechanism of the changes could provide useful information on the nature of sleep. The following conclusions were reached: (1) The surface ECG is a function of both the electrical activity of the heart and the transfer of the signals to the body surface. (2) An analysis of the transfer function extends the usefulness of the ECG. (3) Three modes of R and S amplitude changes occur during sleep. wave amplitudes may reflect changes in left ventricular end diastolic volume. R.E.S.

N80-29023*# GARD, Inc., Niles, Ill.
DESIGN, FABRICATION AND TESTING OF A DUAL CATALYST AMMONIA REMOVAL SYSTEM FOR A URINE VCD UNIT Final Report
P. Budinikas Jun. 1980 43 p ref
(Contract NAS2-10237)
(NASA-CR-152372) Avail: NTIS HC A03/MF A01 CSCL 06B

A three-man capacity catalytic system for the recovery of water from urine was designed, constructed, and tested. it was designed to operate with feed streams containing high concentrations of urine vapor and only 5 to 7% of oxygen for the oxidation of ammonia and volatile organic vapor.It can operate either in a flow-through or a recycle mode and is capable of accepting the urine vapor produced by a vapor compression distillation evaporator. Testing consisted of short preliminary and optimization test, an endurance test of 74 hours continuous operation, and recycle tests using both air and oxygen. The system was designed for a urine processing rate of 0.86 liters/hr; however, it was tested at rates up to 1.2 liter/hr. Untreated urine evaporated by an electrically heated evaporator was used. The quality of the recovered water meets the U.S. Drinking Water Standards, with the exception of a low pH. Accumulation of solids in the urine sludge is reduced to approximately 65% of the anticipated value. L.F.M.

N80-29024*# Houston Univ., Clear Lake, Tex.
ASTRONAUT TRAINING MANUAL Final Report
Eugene A. Coleman 30 Jun. 1980 251 p refs
(Contract NAS9-15642)
(NASA-CR-160758) Avail: NTIS HC A12/MF A01 CSCL 05I

Scientific information from previous space flights, space medicine, exercise physiology, and sports medicine was used to prepare a physical fitness manual suitable for use by members of the NASA astronaut population. A variety of scientifically valid exercise programs and activities suitable for the development of physical fitness are provided. Programs, activities, and supportive scientific data are presented in a concise, easy to read format so as to permit the user to select his or her mode of training with confidence and devote time previously spent experimenting with training routines to preparation for space flight. The programs and activities included were tested and shown to be effective and enjoyable. E.D.K.

N80-29025*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF RESTRICTED MOBILITY ON RNA CONTENT AND NUCLEOTIDE COMPOSITION AND ON PROTEIN CONTENT IN MOTONEURONS OF SPINAL CORD ANTERIOR HORNS
A. V. Gorbunova Jun. 1980 7 p Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 199, no. 4, 1971 p 976-979 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of Med. and Biol. Problems, USSR Min. of Public Health
(Contract NASw-3198)
(NASA-TM-76190) Avail: NTIS HC A02/MF A01 CSCL 06S

An investigation into the effect of hypokinesia on the ribonucleic acid (RNA) content, the nucleotide composition, and dynamics of protein content in the motoneuron of the rat spinal cord anterior horns is described. Methodology and findings are presented. The study results showed that the nucleotide composition of the total cellular RNA at all the studied periods of hypokinesia remained unchanged and is characteristic for the cytoplasmic, high polymer ribosomal RNA. This means that with a change in the functional state of the neuron the newly formed RNA of the nerve cell has the same composition of bases as the original RNA that belongs to the ribosomal type. Author

N80-29026*# National Aeronautics and Space Administration, Washington, D. C.
RNA CONTENT IN SPINAL CORD MOTONEURONS DURING HYPOKINESIA
A. V. Gorbunova Jun. 1980 9 p refs Transl. into ENGLISH from Tsitologiya (USSR), v. 13, no. 1, Jan. 1971 p 83-87 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prepared by USSR Ministry of Public Health
(Contract NASw-3198)
(NASA-TM-76200) Avail: NTIS HC A02/MF A01 CSCL 06S

The effect of a diminished motor activity of rats upon the ribonucleic and (RNA) content in a single isolated motoneuron of frontal of their spinal cord was studied. Within a 1 to 30 day exposure of rats to the hypokinetic conditions, RNA content was found to decrease on the 1st, 3rd, and 5th day and to return to the initial level by the 7th day. No changes in RNA content were observed during the subsequent stages of the experiments. The volume of the nerve cells declined on the 3rd and 5th day, whereas RNA concentration reduced on the 1st, 3rd, 5th, and 30th day. L.F.M.

N80-29027# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A COMPUTER IMPLEMENTATION OF A THEORY OF HUMAN STEREO VISION
W. E. L. Grimson Jan. 1980 62 p refs
(Contract N00014-75-C-0643; Grant NSF MCS-77-07569)
(AD-A084696; AI-M-565) Avail: NTIS HC A04/MF A01 CSCL 06/16

Recently, Marr and Poggio (1979) presented a theory of human stereo vision. An implementation of that theory is presented, and consists of five steps: (1) The left and right images are each filtered with masks of four sizes that increase with eccentricity; the shape of these masks is given by the laplacian of a Gaussian function. (2) Zero-crossings in the filtered images are found along horizontal scan lines. (3) For each mask size, matching takes place between zero-crossings of the same sign and roughly the same orientation in the two images, for a range of disparities up to about the width of the mask's central region. Within this disparity range, Marr and Poggio showed that false targets pose only a simple problem. (4) The output of the wide masks can control vergence movements, thus causing small masks to come into correspondence. In this way, the matching process gradually moves from dealing with large disparities at a low resolution to dealing with small disparities at a high resolution. (5) When a correspondence is achieved, it is stored in a dynamic buffer, called the 2 1/2 dimensional sketch. To support the sufficiency of the Marr-Poggio model of human stereo vision, the implementation was tested on a wide range of stereograms from the human stereopsis literature. The performance of the implementation is illustrated and compared with human perception. As well, statistical assumptions made by Marr and Poggio are supported by comparison with statistics found in practice. Finally, the process of implementing the theory has led to the clarification and refinement of a number of details within the theory; these are discussed in detail. GRA

N80-29028# Wayne State Univ., Detroit, Mich. Ergonomics Research Lab.
A TECHNIQUE FOR ESTABLISHING TRUE LEVELS OF MUSCLE STRENGTH EXERTION Final Report, 1 Jun. 1979 - 31 Jan. 1980

K. H. E. Kroemer and W. S. Marras Jan. 1980 85 p refs
(Contract F49620-79-C-0109; AF Proj. 2313)
(AD-A083576; AFOSR-80-0263TR) Avail: NTIS HC A05/MF A01 CSCL 06/16

Experiments were performed with 20 female and 20 male subjects in order to determine indicators of whether the subjects performed maximal or submaximal isometric strength exertion. The exertion tested were elbow flexion, finger flexion, knee flexion and knee extension. The only performance measures used were analog recordings of the strength scores exerted on a static dynamometer. The following was found: (1) The variability of tests scores in repeated exertion is not a viable indicator of the actual portion of individual strength exerted. (2) The buildup phase of strength exertion is a reliable indicator of the force level to be attained. The steeper the strength formation curve, the stronger the following muscle strength exertion. GRA

N80-29029# Oak Ridge National Lab., Tenn. Health and Environmental Studies Program.
CHEMICAL IDENTIFIED IN HUMAN BIOLOGICAL MEDIA: A DATA BASE, VOLUME 1, PART 1, RECORDS 1-1580 Annual Report, Oct. 1979
M. Virginia Cone, comp., Margaret F. Baldauf, comp., Fay M. Martin, comp., and John T. Ensminger, comp. Mar. 1980 314 p refs
(Contract W-7405-eng-26)
(ORNL/EIS-163/V1-P1; APR-1) Avail: NTIS HC A14/MF A01

A comprehensive data base of chemicals identified in human biological media (tissues and body fluids) is presented in two volumes. The data base in given in this volume in tabular form and arranged alphabetically by CAS 'preferred chemical name'. R.E.S.

N80-29030# Oak Ridge National Lab., Tenn. Health and Environmental Studies Program.
CHEMICALS IDENTIFIED IN HUMAN BIOLOGICAL MEDIA: A DATA BASE, VOLUME 1, PART 2, RECORDS 1-1580 Annual Report, Oct. 1979
M. Virginia Cone, comp., Margaret F. Baldauf, comp., Fay M. Martin, comp., and John T. Ensminger, comp. Mar. 1980 816 p refs
(Contract W-7405-eng-26)
(ORNL/EIS-163/V1-P2; APR-1) Avail: NTIS HC A99/MF A01

A comprehensive data base of chemicals identified in human biological media (tissues and body fluids) is presented in two volumes. Introductory material, references, appendices, indices, and a chemical directory are given in this volume as a user guide to the data base. R.E.S.

N80-29031# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
INITIAL STUDY ON THE EFFECTS OF TRANSFORMER AND TRANSMISSION LINE NOISE ON PEOPLE. VOLUME 1: ANNOYANCE Final Report
K. S. Pearsons, R. L. Bennett, and S. A. Fidell Dec. 1979 114 p refs Sponsored by DOE 3 Vol.
(EPRI-EA-1240-Vol-1; EPRI-RP852-Vol-1) Avail: NTIS HC A06/MF A01

The relative annoyance of transmission line and transformer noise along with shaped noise and other environmental noises was evaluated in a laboratory setting. Thirty-two test subjects made paired comparisons of the annoyance of 19 signals under free field listening conditions. The study shows that transformer noise is about 10 decibles more acceptable than transmission line noise and thus casts doubt on the general validity of the A-weighted sound level index as a predictor of the relative noise annoyance of transformer noise as compared to transmission line corona noise. The inadequacy of the dBA as a unit for assessing certain types of relative noise evaluation is confirmed. DOE

N80-29032# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
INITIAL STUDY ON THE EFFECTS OF TRANSFORMER AND TRANSMISSION LINE NOISE ON PEOPLE. VOLUME 2: SLEEP INTERFERENCE Final Report
R. D. Horonjeff, R. L. Bennett, and S. R. Teffeteller Dec. 1979 68 p refs Sponsored by Electric Power Research Inst. 3 Vol.
(EPRI-EA-1240-Vol-2; EPRI-RP852-Vol-2) Avail: NTIS HC A04/MF A01

The relative awakening potential of four different sounds (a transformer, transmission line, window air conditioner, and distant traffic) was evaluated in a behavioral awakening study conducted in peoples' own homes. Fourteen participants in the Los Angeles, California area each participated in the experiment for a three week period. The results of the study indicate that the transformer, air conditioner, and traffic sounds would all awaken essentially the same proportion of the test population when presented at the same A-weighted sound level. The transmission line around, however, had to be presented at a level 10 dB(A) less than the other sounds to awaken an equivalent proportion of the population. DOE

N80-29033# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
INITIAL STUDY ON THE EFFECTS OF TRANSFORMER AND TRANSMISSION LINE NOISE ON PEOPLE. VOLUME 3: COMMUNITY REACTION Final Report
S. A. Fidell, S. R. Teffeteller, and K. S. Pearsons Dec. 1979 61 p refs 3 Vol.
(EPRI-EA-1240-Vol-3; EPRI-RP852-Vol-3) Avail: NTIS HC A04/MF A01

A social survey intended to assess reactions to exposure to noise emissions of overhead electric power transmission lines and power transformers was conducted in Southern California. A structured questionnaire was administered by personal interview to a purposive sample of about 400 people residing at 17 sites along power line rights-of-way and in neighborhoods adjacent to transformer substations in urban areas. Estimates of the proportion of the American population exposed to noise of different levels from power lines and transformers were developed by analyses of several information sources. Acoustic measurements were made at all interviewing sites to assess the contributions of these low level electrical noise sources to overall background noise environments. DOE

N80-29034# Oak Ridge National Lab., Tenn. Industrial Safety and Applied Health Physics Div.
HEALTH EFFECTS OF LOW LEVEL RADIATION
John A. Auxier 1980 13 p
(Contract W-7405-eng-26)
(DOE/TIC-11176) Avail: NTIS HC A02/MF A01

The health and environmental effects of low level radiation are reviewed. Emphasis is placed on effects on bone marrow and incidence of leukemia. Dose response curves are presented. DOE

N80-29035# CarboMedics, Inc., San Diego, Calif.
STUDIES OF CARBON-SURFACED POLYMERIC, METALLIC AND CERAMIC BIOMATERIALS Annual Report, 1 Apr. 1978 - 31 Mar. 1979
A. D. Haubold and H. S. Shim Dec. 1979 71 p refs
(Contract N01-HV-4-2928)
(PB80-168859) Avail: NTIS HC A04/MF A01 CSCL 06B

Carbon-surfaced composite biomaterials were investigated in order to: (1) determine whether thin carbon films that have physical and chemical properties similar to those of LTI carbon also confer the biochemical properties of LTI carbon to the coated composites, and (2) determine if the carbon-surfaced composites possess the necessary engineering properties for use in prosthetic devices. It was found that the strain to failure of carbon films on polymeric substrates is on the order of 4 to 5%. Failure of the carbon coating always coincided with the onset of plastic deformation in the substrate. The adhesion of the thin coatings is greater than the bulk strength of the polymer. GRA

N80-29036# National Technical Information Service, Springfield, Va.

AIRCRAFT SONIC BOOM: BIOLOGICAL EFFECTS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Apr. 1980

Elizabeth A. Harrison May 1980 89 p Supersedes NTIS/PS-79/0190: NTIS/PS-78/0120

(PB80-810310: NTIS/PS-79/0190: NTIS/PS-78/0120) Avail: NTIS HC $30.00/MF $30.00 CSCL 06S

The selected abstracts of research reports cover the effects of sonic booms on humans, animals, birds, and fish. Discussions of biophysics, psychoacoustics, stress, and auditory tolerances are presented, along with materials on startle responses, disturbance, and compression wave reactions. This updated bibliography contains 82 abstracts. GRA

N80-29037# National Technical Information Service, Springfield, Va.

HYPOTHERMIA. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - May 1980

Elizabeth A. Harrison May 1980 257 p Supersedes NTIS/PS-79/0533: NTIS/PS-78/0517

(PB80-180526: NTIS/PS-79/0533: NTIS/PS-78/0517) Avail: NTIS HC $30.00/MF $30.00 CSCL 06S

The selected abstracts cover high pressure narcosis, organ preservation, hyperbaric conditions, thermal homeostasis, thermoregulation, cold stress, cold tolerance, physiological effects and cold water immersion as related to hypothermia. This updated bibliography contains 250 abstracts. GRA

N80-29038 Flying Personnel Research Committee, London (England).

RESEARCH ABSTRACTS IN THE BEHAVIOURAL SCIENCES, 1971 TO 1975: A BIBLIOGRAPHY

Oct. 1979 55 p

(FPRC-Memo-259; BR70999) Copyright. Avail: Issuing Activity

Abstracts of 122 papers representing work completed by the Royal Air Force between 1971 and 1975 are presented. Subjects studied include: general psychology; group and interpersonal processes; military structure and political processes; personal atitudes and evaluation; aviation medicine; physiological psychology and psychopharmacology; stress and performance; flight simulation; human factors and equipment design; ergonometrics of both air traffic control systems; and map design. Author (ESA)

N80-29039# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

THE EFFECT OF A PREDICTIVE WIND SHEAR CHART ON PILOT LANDING PERFORMANCE

Eric Nick Solowka Apr. 1980 82 p refs Sponsored by National Research Council of Canada

(UTIAS-TN-220; ISSN-0082-5263) Avail: NTIS HC A05/MF A01

A fixed base aircraft simulator limited to providing only the longitudinal equations of motion was used to study the effect of a predictive wind shear chart on landing performance through wind shear. It was found that the introduction of the predictive wind shear chart alone did not significantly alter the pilot's landing performance. Training as to wind shear effect and limited coaching combined with the presence of the predictive shear display did however improve pilot ability to maintain the aircraft on the desired flight path with little effect on airspeed control. This inability to improve airspeed control might not be an indication of poor pilot performance but suggests the adoption of another airspeed performance criterion. The overreaction of pilots to a novel wind shear (that was slightly different from those used in training flights) when the wind shear chart was available to them indicates that although better glide slope control can be achieved, care will have to be exercised when introducing a predictive shear display to the general aviation field. R.E.S.

N80-29040# Analytics, Inc., Willow Grove, Pa.

DECISION AIDS FOR NAVAL AIR ASW Technical Report, Aug. 1978 - Aug. 1979

Wayne W. Zachary 15 Mar. 1980 136 p refs

(Contract N00014-78-C-0743; NR Proj. 199-003)

(AD-A085134; Rept-1366-A) Avail: NTIS HC A07/MF A01 CSCL 15/7

This report examines the applicability of a variety of decision aiding techniques to operation decision situations encountered in Naval Air Anti-Submarine Warfare (ASW). Decisions performed by the Tactical Coordinator (TACCO) in the three major Navy air ASW platforms, P-3C, S-3A, and LAMPS MK-III, are examined and synthesized into six decision making situations. These six situations are lost contact reacquisition, contact classification/verification, on-station search, localization, surveillance tracking, and attack planning. They represent distinct decision making contexts in which specific mission objectives are sougnt. A method for prioritizing these decision situations for decision and construction is developed and applied. A survey of numerous decision aids and a detailed analysis of 15 military decision aids results in the development of a six category taxonomy of decision aiding techniques. Possible combinations of techniques that could be applied to aid each of the decision situations are determined by matching the decision aiding techniques from the taxonomy to the detailed descriptions of the decision situations. The matching of techniques to situations is facilitated by the development of a descriptive framework for the decision situations. The categories in this framework are chosen so as to uncover the aspects of the situations most amenable to decision aiding by the techniques in the taxonomy. GRA

N80-29041# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Clinical Research Div.

AUTOMATED PSYCHOLOGICAL STRESS DETECTION IN AN ENTRY PORTAL SYSTEM Final Report

Jerry G. Davis, Jack A. Loeppky, and Michael D. Venters Oct. 1979 35 p refs

(Contracts EY-76-C-04-0789; DE-AC04-76DP-00789)

(SAND-80-7026) Avail: NTIS HC A03/MF A01

The application of automatic psychological stress detection to persons entering a secured facility through an entry portal is discussed. The numerous technical considerations in transducing the required physiological signals are presented. The major methods that a psychologically stressed person might utilize in an attempt to evade detection are also discussed. The prime evasionary method of drug intervention is given added emphasis. The hardware requirements for a typical installation are presented. DOE

N80-29042# Institut de Recherche de Transports, Bron (France). Centre d'Evaluation et de Recherche des Nuisances.

EFFECTS OF AIRCRAFT NOISE ON SLEEP: AN IN-SITU EXPERIENCE

M. Vallet, J. M. Gagneux, and F. Simonet 1979 10 p refs Presented at 3d Intern. Congr. on Noise as a Public Health Problem Sponsored by Min. de l'Environ. and Direc. de l'Aviation Civile

Avail: NTIS HC A02/MF A01

Electroencephalogram data and bedroom noise levels were recorded during four consecutive nights for 40 men living near the Roissy Airport in Paris questionnaire about sleep quality was administered each morning. All subjects had lived in the same location before the opening of the airport, and had been exposed to the noise for at least a year. The immediate effects of each noise event were noted and an analysis made of sleep structure. For the noisiest nights, total sleep decreased as the noise increased sleep induction latency increased with the noise index, and stage three and four sleep increase were noted. Author (ESA)

N80-29043*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM: ANALYSIS OF STS-1

G. J. Steines Jul. 1980 38 p refs

(NASA-TM-81032; JSC-16730; Rept-80-FM-36) Avail: NTIS HC A03/MF A01 CSCL 06K

The capability of the orbiter environmental control and life support system (ECLSS) to support vehicle cooling requirements in the event of cabin pressure reduction to 9 psia was evaluated,

using the Orbiter versions of the shuttle environmental consumables usage requirement evaluation (SECURE) program, and using heat load input data developed by the spacecraft electrical power simulator (SEPS) program. The SECURE model used in the analysis, the timeline and ECLSS configuration used in formulating the analysis, and the results of the analysis are presented. The conclusion which may be drawn drom these results, is summarized. There are no significant thermal problems with the proposed mission. There are, however, several procedures which could be optimized for better performance: setting the cabin HX air bypass and the interchanger water bypass to the zero flow position is of questionable efficacy; the cabin air pressure monitoring procedure should be re-evaluated; and the degree of equipment power down specified for this analysis and no problems were noted. A.R.H.

N80-29044# Naval Postgraduate School, Monterey, Calif.
THE ADVANTAGE OF THE COLOR-CODE MODALITY VERSUS ALPHANUMERIC AND SYMBOL CODE M.S. Thesis
Henning Hoops Mar. 1980 68 p refs
(AD-A084383) Avail: NTIS HC A04/MF A01 CSCL 05/8

This study describes an experiment designed to investigate potential advantages and/or disadvantages of color-coding relative to symbol - or alphanumeric-codes. Performance was evaluated in terms of reaction time and the number and type of errors made. The stimuli used in the experiment were the letters: E, F, N, U, the colors: red, yellow, green, blue, and the symbols: square, triangle, circle, and cross. They stood for enemy, friendly, neutral, and unknown forces, respectively. The analysis of the data obtained from the experiment suggested that the color and symbol-codes were significantly better than the alphanumeric-code with respect to the number of errors. The reaction time of the color-code was shortest, followed by the symbol-code with reaction time for the alphanumerics being longest. GRA

N80-29045# Donrich Research, Inc., West Palm Beach, Fla.
DETERMINATION OF THE IMPACT OF DIGITAL DATA BROADCAST ON FLIGHT TECHNICAL ERROR Final Report
Donald W. Richardson Feb. 1980 85 p refs
(Contract DOT-FA01-80-P-85745)
(AD-A085177; F-80-01; FAA/RD-80-35) Avail: NTIS HC A05/MF A01 CSCL 05/9

This report documents the data reduction and analysis of existing flight test data regarding the digital data broadcast system (DDBS) concept of automating cockpit data input procedures in an area navigation environment. Particular attention is paid to the statistical quantification of the impact of the DDBS concept on pilot steering performance, mainly flight technical error (FTE). Results of this analysis indicate that DDBS significantly reduces both pilot blunder rate and FTE, for both the enroute and approach phases of flight. GRA

N80-29046# National Technical Information Service, Springfield, Va.
PROTECTIVE CLOTHING: ARCTIC AND TROPICAL ENVIRONMENTS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - 1980
Edith Kenton Apr. 1980 126 p Supersedes NTIS/PS-79/0436; NTIS/PS-78/0371
(PB80-809635; NTIS/PS-79/0436; NTIS/PS-78/0371) Avail: NTIS HC $30.00/MF $30.00 CSCL 06Q

A bibliography containing 120 abstracts concerning clothing for environmental protection in extreme climates is given. Fabrics and textiles, insulating methods, physiological and psychological responses of users, mobility and dexterity of wearers, care of specialized clothing, and human factors involved are specifically addressed. GRA

N80-29047# National Technical Information Service, Springfield, Va.
PROTECTIVE CLOTHING: SURVIVAL, AIRCRAFT, AND COMBAT ENVIRONMENTS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Apr. 1980
Edith Kenton Apr. 1980 230 p Supersedes NTIS/PS-79/0438; NTIS/PS-78/0373
(PB80-809650; NTIS/PS-79/0438; NTIS/PS-78/0373) Avail: NTIS HC $30.00/MF $30.00 CSCL 06Q

A bibliography containing 224 abstracts is presented addressing the design, testing, and evaluation of protective apparel for pilots in various conditions of climate and gravity, for military personnel in combat conditions, for persons in special circumstances of exposure and survival, such as the ocean environment, and for other aviation personnel. GRA

N80-29983 Louisiana State Univ., New Orleans.
BLOOD FLOW TO ADIPOSE TISSUES IN THE MALE SPRAGUE-DAWLEY RAT Ph.D. Thesis
Barbara Jean Maren 1980 214 p
Avail: Univ. Microfilms Order No. 8018275

The differences in adipocyte size among adipose depots in the male Sprague Dawley rat were studied with respect to their effect on blood flow. Blood flow was also examined within adipose depots to detect how it might vary with an increase of both adipocyte size and animal body size (age). In addition, since adipose tissue serves different metabolic functions of the body during the fed and fasted states, the effect of nutritional status on adipose tissue blood flow was studied. Results are presented. Dissert. Abstr.

N80-29984 New York Univ., N. Y.
VESTIBULAR COMPENSATION IN THE RAT: A MODEL FOR MOTOR LEARNING Ph.D. Thesis
Kerry Dee Walton 1980 290 p
Avail: Univ. Microfilms Order No. 8017600

A global picture of the changes in neuronal activity underlying the acquisition and retention of vestibular compensation (VC). Brain stem and cerebellar nuclear levels was obtained using 2-deoxy-D-glucose. The distribution of glucose uptake at these sites was determined in normal, uncompensated, compensated, and 3-acetylpyridine decompensated animals. Results indicate that the asymmetries following hemilabyrinthectomy reflect an imbalance in the activity of the vestibular nuclei (VN) and that compensation results from the restoration of balance. In uncompensated and decompensated animals the VN ipsilateral to the lesion were significantly less active than the contralateral VN. In compensated animals, VN activity was the same on the both sides, the level being close to or higher than normal. Thus, VC is accompanied by an increase in activity in the ipsilateral VN. Author

N80-29985 California Univ., Davis.
EFFECT OF ACCELERATION ON CIRCULATORY AND RESPIRATORY FUNCTION IN THE DOMESTIC FOWL Ph.D. Thesis
Sue Carol Walgenbach 1979 123 p
Avail: Univ. Microfilms Order No. 8016790

The respiratory and circulatory function was examined in chickens exposed to high sustained G sub z (exposure to fields greater than 6 G for 15 seconds: HGS sub z) Acceleration tolerance was determined for cocks exposed to + 6, +8, +10, and +12 G sub z. Acceleration tolerance time was found to be hyperbolically related to the field strength (G). Blood gases in chickens during HSG sub z exposure showed that chickens, unlike mammals, had near normal PaO2 and PaCO2. Forced ventilation of centrifuging chickens with oxygen increased PaO, a response not found mammals. Ventilation of one lung with air produced near normal PaO2 and PaCO, at 1 G, but in HGS sub z gave low PaO, as observed in spontaneously breathing mammals. Ventilation did not extend all tolerance times suggesting circulatory impairments are principally responsible for acceleration tolerance limitations. Expired P(CO2) during oxygen ventilation indicated that cardiac output decreased during HSG sub z, even down to zero for several seconds; after HSG sub z, expired P(CO2) increased, indicating that oxygen debt and metabolism perfusion inequalities were developed during HSG sub z.
Dissert. Abstr.

N80-29986 Kentucky Univ., Lexington.
THE NEURAL CONTROL OF THE CORONARY CIRCULATION DURING BEHAVIORAL STRESS IN CONSCIOUS DOGS Ph.D. Thesis

George Edward Billman 1980 161 p
Avail: Univ. Microfilms Order No. 8018226

Experiments were performed on eight (3 female, 5 male) mongrel dogs during classical aversive conditioning. The conditioning paradigm consisted of two 30 second tones; one was paired with a one second pulsed DC shock, the other was nonreinforced. The subjects were chronically instrumented to measure aortic pressure, left ventricular pressure, and left circumflex coronary blood flow. The data were analyzed with multifactorial analysis of variances and Newman's-Keul's multiple range test. Results indicate that the coronary vascular response to stress consisted of two components: an initial alpha adrenergic vasoconstriction followed by a more complex vasodilation, which was mediated by metabolites released secondarily to increases in heart rate and inotropic state. The vasodilation may also involve a reactive hyperemic response to the initial vasoconstriction or perhaps a reflex withdrawal of alpha receptor tonus. Dissert. Abstr.

N80-29987 Florida Technological Univ., Orlando.
A COMPARATIVE STUDY IN MOLECULAR AGING: ALTERATIONS TO THE NUCLEIC ACIDS OF CELLS OF A REPRESENTATIVE PLANT, INVERTEBRATE AND VERTEBRATE ANIMAL OF VARIOUS AGES Ph.D. Thesis
Charles David Allen Polson 1979 93 p
Avail: Univ. Microfilms Order No. 8016621

The DNA of three tissues of Mus musculus, wild type and short lived vestigial wing mutant of Drosophila melanogaster and cotyledons of bush beans, Phaseolus vulgaris, was examined for age related fragmentation, formation of single stranded gaps, and decrease in RNA genes. Agarose gel electrophoresis showed that no DNA fragmentation occurred in wild type or vestigial wing Drosophila, or in DNA from mouse brain and heart. Mouse liver appeared to possess a large fragment in both ages tested; thus, no age related change occurred. Phaseolus cotyledon DNA possessed a fragment of approximately 3.5 megadaltons in both imbibed seeds and 12 day old cotyledons. Therefore, there was no age related increase in DNA fragmentation. Results indicate that DNA fragmentation, formation of single-stranded gaps, and loss of RNA genes are not of universal occurrence in aging organisms. Dissert. Abstr.

N80-29988 American Univ., Washington, D. C.
INTERACTION OF ELECTROMAGNETIC ENERGY WITH ABSORPTIVE MATERIAL BY THERMALLY INDUCING ELASTIC STRESS WAVES Ph.D Thesis
Kenneth John Oscar 1980 225 p
Avail: Univ. Microfilms Order No. 8017445

Rats were exposed to 1.3 or 2.8 gHz, pulsed or continuous wave (CW) microwave energy. Exposure time, incident power, and microwave pulse characteristics were varied. Local cerebral blood flow, blood volume, and blood-brain barrier permeability experiments were performed with several different, quantitative, radioactive isotope techniques with measurement by brain homogenization and liquid scintillation counting. It was confirmed that low power microwaves could alter the uptake of small molecular weight saccharides in the blood-brain barrier of rats. It was further learned that the permeability increases occurred for small but not large molecular weight saccharides. The rises returned to normal after 24 hours and were of greatest magnitude in the medulla, cerebellum, and hypothalamus. The relationship between the magnitude of the increase and the pulse characteristics of the microwaves were determined. Other pertinent observation and results are reported. Dissert. Abstr.

N80-29989# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
BIOMEDICAL RESEARCH, DEVELOPMENT AND ENGINEERING AT THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY Annual Report, 1 Oct. 1978 - 30 Sep. 1979
Oct. 1979 74 p refs
(PB80-175268; JHU/APL/MQR-79) Avail: NTIS HC A04/MF A01 CSCL 06B

The Medical Institutions of The Johns Hopkins University and The Johns Hopkins University and The Johns Hopkins University Applied Physics Laboratory have developed a vigorous collaborative program of biomedical research, development, and systems engineering. An important objective of the program is to apply the expertise in engineering, the physical sciences, and systems analysis acquired by APL in defense and space research and development to problems of medical research and health care delivery. This program has grown to include collaboration with many of the clinical and basic science departments of the medical divisions. Active collaborative projects exist in ophthalmology, neurosensory research and instrumentation development, cardiovascular systems, patient monitoring, therapeutic and rehabilitation systems, clinical information systems, and clinical engineering. This application of state-of-the-art technology has contributed to advances in many areas of basic medical research and in clinical diagnosis and therapy through improvement of instrumentation, techniques, and basic understanding. GRA

N80-29990# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HIGH-SPEED, LOW-LEVEL FLIGHT: AIRCREW FACTORS
David H. Glaister, ed. (Royal Air Force Inst. of Aviation Medicine) Mar. 1980 321 p refs In ENGLISH and FRENCH Presented at the Aerospace Med. Panel's Meeting, Lisbon, 22-26 Oct. 1979
(AGARD-CP-267O; ISBN-92-835-0263-9) Avail: NTIS HC A14/MF A01

Factors effecting aircrews during high speed, low level flight are addressed. Specific topics include ride quality and the effect of the physical environment; thermal effects; vibration effects; cockpit design and aircrew workload; and escape and survival. Particular attention is paid to ride bumpiness and the influence of airframe design and control strategy, the effects of vibration on vision, and the problems and potential uses of helmet mounted sights and displays.

N80-29991# Royal Air Force, Farnborough (England).
RIDE-BUMPINESS AND THE INFLUENCE OF ACTIVE CONTROL SYSTEMS
J. G. Jones *In* AGARD High-Speed, Low-Level Flight Mar. 1980 16 p refs
Avail: NTIS HC A14/MF A01

The influence of aircraft design and control strategy on aircraft disturbances stressful to aircrew in high-speed, low-altitude flight is discussed. Standard methods for assessing ride quality are briefly reviewed. In addition, a technique is described that combines time-plane characteristics of response with frequency-plane features usually defined in terms of power spectra. This method, which has been developed as a tool for assessing the dynamic response of aircraft in turbulence, may provide useful additional information for human factors work. The technique leads in particular to a 'characteristic signature', in the time plane, of the aircraft response to gusts. In determining the dependence on aircraft dynamics of this characteristic energy pattern emphasis is placed on the concept of signal 'increments' or 'differences', in contrast to the sinusoidal components of Fourier analysis. It is perhaps relevant that the role of signal differences in time or space is also stressed in classical work on the mechanisms of human sensory perception. M.G.

N80-29992# Amt fuer Wehrgeophysik, Traben-Trarbach (West Germany).
INFLUENCES OF GEOPHYSICAL FACTORS (METEOROLOGICAL AND TOPOGRAPHICAL) ON THE PILOT-AIRCRAFT-SYSTEM IN HIGH SPEED LOW LEVEL FLIGHT (HSLLF)

Karl Krames *In* AGARD High-Speed, Low-Level Flight Mar. 1980 46 p refs
Avail: NTIS HC A14/MF A01

The effects of interaction between atmosphere, lithosphere, and biosphere on low level high speed flight are discussed along with particular examinations of visibility, wind, thunderstorms, and sleet and hailstones. Since geophysical hazards are at their maximum in low levels, it follows that an extreme reaction ability of the man-machine system in that domain is an absolute requirement. The primary function of geophysical information consists in assessing those flight routes and flight levels

presenting minimum potential hazards to the accomplishment of the individual military mission. The use of terrain data bases offers an optimal approach in achieving a high degree of resolution on the basis of 95-by-150-m-grid. The inclusion of weather, vegetation, and surface data will ensure detailed flight information. M.G.

N80-29993# British Aerospace Aircraft Group, Preston (England).
DEVELOPMENT IN HIGH-SPEED LOW-LEVEL FLIGHT: THE PILOT'S VIEWPOINT
J. J. Lee *In* AGARD High-Speed, Low-Level Flight Mar. 1980 3 p
Avail: NTIS HC A14/MF A01

Developments in aviation technology during the last one and a half decades leading to significant benefits to high speed low level flight are briefly reviewed. It is concluded that the human characteristics of sensitiveness to stimuli, reaction time, strength/stamina, and adaptability have remained virtually unchanged in evolution terms and will remain a constant in flight assessment. Given the requirements of the mission and the scenario, the areas where development can be applied to improve mission success still remain firmly in the fields of performance, handling, guidance/navigation and vehicle design characteristics. M.G.

N80-29994# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
BIOTECHNOLOGY CHALLENGES PRESENT IN OPERATIONAL HIGH-SPEED LOW-LEVEL FLIGHT
Roy L. DeHart *In* AGARD High-Speed, Low-Level Flight Mar. 1980 6 p refs
Avail: NTIS HC A14/MF A01

Operational stressors in high speed low level flight (HSLL) are identified for the mission scenarios of the B-52, F-111, and the A-10 aircraft. It is concluded that there exists a common technology need requiring contributions from the aerospace medical practitioner which becomes evident in discussing the aircraft in their respective HSLL combat missions. Continued development of automated systems integrating components within the cockpit affecting aircraft controls and weapons delivery systems is required. The specialist in aerospace medicine must ensure that sophisticated systems do in fact offload peripheral tasks of the pilot and increase his performance and ability to successfully accomplish the mission in a high threat combat environment. In addition, it is evident opportunities are available for biotechnology to improve or develop systems providing required information to the aircrew member in a method or format which permits him to remain heads-up and eyes-out-of the cockpit. M.G.

N80-29995# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).
THERMIC PROBLEMS PRESENTED BY HIGH-SPEED, LOW-LEVEL FLIGHT [PROBLEMES THERMIQUES POSES PAR LE VOL A GRANDE VITESSE ET A BASSE ALTITUDE]
J. Timbal and J. Colin *In* AGARD High-Speed, Low-Level Flight Mar. 1980 7 p refs In FRENCH

Avail: NTIS HC A14/MF A01

In certain cases, high speed flight at low altitude is likely to create conditions which surpass the tolerance limits of pilots. The physical factors of the environment as well as their effects on performance have been the subject of numerous studies. One method of predicting the period of heat tolerance is presented and discussed. The important part played by the humidity of the air and the physical activity of the pilot is demonstrated. The prevention of climatic inconveniences requires the use of relatively simple means which must be put into effect before flight. During the course of flight, prevention implies that the inconveniences were predicted during the design of the aircraft. The problem of risk associated with thermal loads is discussed under three principles: evaluating thermal ambience, evaluating human tolerance, and increasing the tolerance. Transl. by A.R.H.

N80-29996# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
EFFECTS ON PERFORMANCE OF THERMAL STRAIN ENCOUNTERED DURING HIGH-SPEED, LOW-LEVEL FLIGHT
T. M. Gibson, J. R. Allan, C. J. Lawson, and R. G. Green *In* AGARD High-Speed, Low-Level Flight Mar. 1980 9 p refs

Avail: NTIS HC A14/MF A01

The effects of thermal strain on pilot performance during high speed, low level flight are examined through flight simulator testing. Each subject carried out two replicate experiments in which he was first heated to a deep body temperature of 37.5 C, then alternately heated and cooled twice between deep body temperature limits of 37.9 and 38.5 C, and finally cooled to 37.5 C. Core temperatures and skin temperatures were monitored. The results demonstrate that differences in performance on the flight simulator can be produced by heating or cooling the skin at the same level of deep body temperature. These differences do not exist at deep body temperatures of 37.5 C, but at core temperatures between 37.9 and 38.5 C, performance during heating is worse than during cooling. Above the critical core temperature (i.e., above 37.5 C), skin temperature is a more important determinant of performance than the absolute level of deep body temperature; it is, however, impossible to exclude possible effects on performance of direction and rate of change of both core and skin temperatures. It is clear that the thermal strain encountered by aircrew in routine high speed, low level flight in warm conditions could cause a reduction in the operational capability of the aircrew. The situation will be exacerbated by anything that increases the thermal strain such as the wearing of more insulative protective clothing, higher work rates and repeated sorties separated by inadequate time for thermal recovery. M.G.

N80-29997# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.
AIRCREW HEAT STRESS DURING HIGH-SPEED, LOW-LEVEL FLIGHT
Richard F. Stribley and Sarah A. Nunneley *In* AGARD High-Speed, Low-Level Flight Mar. 1980 5 p refs

Avail: NTIS HC A14/MF A01

An overview of the problems related to aircrew heat stress during high speed low level flight is given. Physiological heat exchange mechanisms in the cockpit environment and the performance consequences of heat stress are examined. Current cockpit cooling systems designs are assessed and suggestions are made for the design of man-oriented cockpit cooling. M.G.

N80-29998# Laboratoire Central de Biologie Aerospatiale, Paris (France).
QUANTIFYING THE AGRESSION GENERATED BY LOW FREQUENCY VIBRATIONS [ESSAI DE QUANTIFICATION DE L'AGRESSION ENGENDREE PAR LES VIBRATIONS DE BASSE FREQUENCE]
P. Quandieu, P. Borredon, J. C. Rouhet, and L. Pellieux *In* AGARD High-Speed, Low-Level Flight Mar. 1980 17 p refs In FRENCH
Avail: NTIS HC A14/MF A01

From a biomechanical viewpoint, man can be considered as a deformable solid under the effect of mechanical stimulation such that as provoked by flight at high speed and low altitude. A physiological response to physical stimulation results and muscular mass struggles against the deformation imposed. According to the degree of muscle tension, the vibratory response of the subject is a phase displacement in relation to the oscillation which gives birth to movement. The final deformation is the result of mechanical action and physiological reaction. A baboon was used in laboratory tests to demonstrate magnitude of the mechanical capability to account for the behavior of a subject exposed to vibrations. A loads transducer and an accelerometer were placed at the point where force was applied in order to determine the effective mass (the complex relation of dynamic force to the acceleration). With the help of measurements obtained totally outside the body, it was possible to record an eminently

variable dynamic behavior the whole length of the same vibration. The importance of the variations obtained on the parameters considered provides hope for using the method to examine the total behavior of man exposed to vibrations. Transl. by A.R.H.

N80-29999# Naval Aerospace Medical Research Lab., New Orleans, La.
A METHOD FOR STUDYING HUMAN BIODYNAMIC RESPONSES TO WHOLE-BODY Z-AXIS
J. C. Guignard, C. L. Ewing, G. C. Willems, W. Anderson, W. H. Muzzy, III, D. J. Thomas, and P. L. Majewski *In* AGARD High-Speed, Low-Level Flight Mar. 1980 7 p refs

Avail: NTIS HC A14/MF A01

The methodology used as well as some illustrative results obtained in current experiments to determine the transmissibility of mechanical vibration to major axial segments (pelvis, upper torso, head) of the seated human body vibrated in the z-axis are presented. Factors influencing transmissibility are mentioned and the importance of controlling such factors in experimental determinations of the human biodynamic response to vibration is discussed. The methodology described, adapted from established use in human impact studies, includes the use of standardized anatomical coordinate systems for data reference, which is essential to the meaningful comparison of responses measured in different subjects or in different conditions of vibration. R.C.T.

N80-30000# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fer Flugmedizin.
HEAD MOVEMENTS INDUCED BY VERTICAL VIBRATIONS
L. Vogt, E. Schwartz, and H. Mertens *In* AGARD High-Speed, Low-Level Flight Mar. 1980 14 p refs

Avail: NTIS HC A14/MF A01

Eleven subjects were vibrated on a shake-table in the frequency range of 2 Hz to 19 Hz to assess the complex head motion induced by z-axis mechanical vibration. Acceleration amplitude was sinusoidal and held constant at 0.35 g (rms). Each subject was given two trials; one sitting relaxed without a backrest; the other leaning against a backrest with a 12 deg inclination from the vertical. Head motion was recorded with a special television camera (x-y tracker) by pursuing a target painted on the temporal part of the subject's forehead. This instrument continuously records the horizontal and vertical coordinates of the tracked point and gives the output as analogues voltages. For each frequency and experimental condition the vertical and horizontal motion of the tracking target was related to the displacement of the shake-table. The results are given as different transmissibility curves for vertical and horizontal head motion. When relating horizontal to vertical transmissibility it becomes obvious that, without a backrest, at the resonant frequency the horizontal transmissibility is about 75 percent of the vertical transmissibility. When using a backrest horizontal transmissibility is reduced to about 35 percent of the vertical transmissibility. R.C.T.

N80-30001# Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF RECLINED SEATING ON THE TRANSMISSION OF LINEAR VIBRATION TO THE HEAD
Mary E. Johnston *In* AGARD High-Speed, Low-Level Flight Mar. 1980 14 p refs

Avail: NTIS HC A14/MF A01

The transmission of vibration to the heads of subjects seated in a Mk 10B ejection seat exposed to vibration within the frequency range 2-25 Hz was measured. Measurements were made for the seat conventionally mounted (back angle 20 deg to the vertical) and reclined for seat back angles of 30 deg., 45 deg., and 60 deg. to the vertical. The seat was vibrated using a swept sine wave technique in either the vertical or lateral direction. Head motion in each of the three head anatomical orthogonal linear axes (G sub x, G ub y, G sub z) was measured on a bite bar fitted with accelerometers. Ten subjects were used, each fitted with a standard Mk 2/3 flying helmet. The results indicate that for a given input, particularly in the lateral axis, head motion increases considerably when the head is in contact with the rest. Also head motion both against and off the rest increases as the seat back angle to the vertical is increased. Such increases in vibration to the head are very uncomfortable and could well lead to a performance decrement for a visual task. R.C.T.

N80-30002# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE EFFECTS OF AIRCRAFT VIBRATION ON VISION

G. R. Barnes *In* AGARD High-Speed, Low-Level Flight Mar. 1980 11 p refs
Avail: NTIS HC A14/MF A01

Movements of the head resulting from aircraft vibration were investigated in terms of their effects on visual performance. Major emphasis was placed on the limitations in the response of the pursuit reflex and the vestibulo-ocular reflex. The following analyses were conducted in order to assess: (1) the frequency characteristics of the vestibulo-ocular and pursuit reflexes; (2) the ability of subjects to suppress reflex vestibular eye movements which become inappropriate when viewing a helmet-mounted display; (3) the effect of relative movement between the eye and the viewed object on visual performance, and (4) the biodynamic response of the head during vibration which gives rise to stimulation of the vestibular system. The results are discussed in an attempt to estimate the effects of aircraft vibration on visual performance. R.C.T.

N80-30003# Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF 3-25 Hz VIBRATION ON THE LEGIBILITY OF NUMERIC LIGHT EMITTING DIODE DISPLAYS
Mary E. Johnston and John H. Wharf *In* AGARD High-Speed, Low-Level Flight Mar. 1980 9 p refs

Avail: NTIS HC A14/MF A01

The effects of 3-25 Hz2 sinusoidal vibration at an rms acceleration level of 2.5 m/s2 in both the vertical and lateral axes on the performance of a reading task are described. The task was to read aloud numeric characters presented on a yellow high luminance light emitting diode display which was designed for the military cockpit. Random numbers were presented on the display in sets of four changed every 3 s. The subjects were each fitted with a MK 2/3 flying helmet and strapped into an Mk 10B ejection seat which was mounted on the same vibration platform as the display. Tests were conducted with the subject's head held both against and just off the head rest. The results indicate that reading performance is affected most by lateral vibration, when the head is against the head rest. Maximum errors occurred for lateral vibration frequencies of 15-16 Hz which is shown to correspond to the probable onset of overlapping nodal images due to head vibration. R.C.T.

N80-30004# Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.
THE EFFECT OF TURBULENCE ON HELMET MOUNTED SIGHT AIMING ACCURACIES
N. O. Tatham *In* AGARD High-Speed, Low-Level Flight Mar. 1980 4 p
Avail: NTIS HC A14/MF A01

The effects of the turbulence associated with high speed, low level flight on the accuracies achievable with helmet mounted sighting equipment were assessed. In-flight analysis were conducted during trials in a Canberra aircraft, flying straight and level at 350 km, 250 ft. Laboratory analysis were conducted using a two axis vibration rig driven by vibration data recorded from the same Canberra aircraft to provide simulated turbulence. Aiming accuracies were obtained for collimated targets fixed in space in the simulation, and for both collimated targets fixed to the airframe and ground targets in flight. The results obtained show a good correlation between aiming errors achieved in flight and those obtained from the simulation, and demonstrate that the aiming errors consist mainly of a low frequency random motion which increases with vibration level. In addition, various

techniques were investigated to overcome the errors involved in order to enable fine aiming to be performed with the helmet sight. R.C.T.

N80-30005# Naval Aerospace Medical Research Lab., New Orleans, La.
CLINICAL MEDICAL EFFECTS OF HEAD AND NECK RESPONSE DURING BIODYNAMIC STRESS EXPERIMENTS
D. J. Thomas, C. L. Ewing, P. L. Majewski, and N. S. Gilbert *In* AGARD High-Speed, Low-Level Flight Mar. 1980 15 p refs
Avail: NTIS HC A14/MF A01

Volunteers were subjected to various degrees of impact acceleration. The directions of applied acceleration were -X (front to back), +Y (right to left), and -X+Y (45 degrees between -X and +Y). The major categories of symptoms were neck pain, headache, restraint related musculoskeletal symptoms, and syncope. A few special cases had findings which required clinical evaluation and followup. The type, extent, duration, and severity of the symptoms were related in some cases to the direction peak acceleration, and acceleration duration. R.C.T.

N80-30006# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
OPERATIONAL ASPECTS OF GUIDANCE AND CONTROL ADVANCES VERSUS PILOT WORKLOAD FOR LOW ALTITUDE, HIGH SPEED FLIGHT
Morris A. Ostgaard *In* AGARD High-Speed, Low-Level Flight Mar. 1980 10 p refs

Avail: NTIS HC A14/MF A01

Some of the characteristics of the human operator and their similarity to guidance and control functions are discussed. It is shown that the operator's characteristics as a controller depend on four kinds of variables: control task variables, which include the system inputs and all the system elements external to the operator; environmental variables such as ambient illumination, temperature, vibration, etc.; operator centered variables such as training, fatigue, motivation; and procedural variables such as instructions, practice, order of presentation relating to a given task. When these variables are essentially time stationary or invariant over an interval of interest, the operator vehicle system can be modeled as a quasilinear system much the same as standard servo loops. R.C.T.

N80-30007# Fraunhofer-Inst. fuer Informations- und Datenverarbeitung, Karlsruhe (West Germany).
TV OPERATOR PERFORMANCE IN REAL TIME AIR-TO-GROUND RECONNAISSANCE MISSIONS UNDER TASK-LOADING CONDITIONS
H. Mutschler *In* AGARD High-Speed, Low-Level Flight Mar. 1980 11 p refs Sponsored by the German Federal Ministry of Defense
Avail: NTIS HC A14/MF A01

The detection performance of a black-and-white-TV operator in real time reconnaissance missions was determined by the parameters of the RPV-system, the scene, and the task. A series of 6 experiments were performed with 19 untrained subjects who had to find military vehicles in static ground scenes displayed on a TV screen. The scenes were presented only shortly, for 1 to 10 secs. This corresponds to a speed of about 50 to 500 km/h at a nonoverlapping frame rate. The subjects pointed to located targets with a light-pen. Analysis of variance indicate that the detection rate is influenced by: (1) scene parameters which consititute the conspicuity of a target in a natural scene, such as global context, contrast and local context; (2) short presentation times of less than 3 secs; (3) system parameters such as resolution and image segmentation; and (4) number of targets. Detection rate decreases if the task is to mark all targets and detection rate increases if the task is only to indicate those scenes which contain at least one target. The false alarm rate decreases with the number of sessions the subjects took part in and was finally at low level. Taking the confidence level expressed into account proved to increase the detection-false alarm ratio remarkably. Search times were nearly equal to presentation times from 1 to 5 secs only. The search times for the 50% detection rate decreased from 4 secs in the first experiment to 2 secs in the last one. R.C.T.

N80-30008# Marconi Avionics Ltd., Rochester (England). Airborne Display Div.
THE INFLUENCE OF THE DESIGN OF DISPLAYS ON COCKPIT WORKLOAD
R. H. Holmes *In* AGARD High-Speed, Low-Level Flight Mar. 1980 10 p
Avail: NTIS HC A14/MF A01

The problems involved in designing display and controls for high speed low level aircraft are discussed with the emphasis on the reduction of cockpit workload. Some modern display techniques are also described. R.C.T.

N80-30009# Marconi Avionics Ltd., Rochester (England). Airborne Display Div.
COLOUR DISPLAYS: THEIR AVAILABILITY, PERFORMANCE AND APPLICATION TO IMPROVED CREW EFFICIENCY
D. W. Hussey *In* AGARD High-Speed, Low-Level Flight Mar. 1980 12 p refs
Avail: NTIS HC A14/MF A01

The use of advanced technology in the form of multifunction electronic displays, processors, sophisticated sensors, and other automated pilot aids are discussed. Guidelines are suggested which are to be used in determining how color is used to enhance the presentation of information. R.C.T.

N80-30010# Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.
HELMET-MOUNTED DEVICES IN LOW-FLYING HIGH-SPEED AIRCRAFT
D. N. Jarrett *In* AGARD High-Speed, Low-Level Flight Mar. 1980 9 p refs
Avail: NTIS HC A14/MF A01

Two separate simulation studies are described. The first assesses the amount of movement occurring between the pilot's helmet and his eyes. The second concerns the legibility of information presented on an experimental LED matrix display. It is concluded that aircraft vibration does not cause significant helmet movement in comparison with natural voluntary head motion, and that the degrading effect of aircraft vibration on the legibility of displayed information could be counteracted using a brighter display. E.D.K.

N80-30011# Naval Air Development Center, Warminster, Pa.
THE ROLE OF HELMET MOUNTED DISPLAYS IN HIGH-SPEED LOW-LEVEL FLIGHT
Gloria Twine Chisum *In* AGARD High-Speed, Low-Level Flight Mar. 1980 5 p refs

Avail: NTIS HC A14/MF A01

During critical phases of flight operations the requirement for shifts of gaze between the environment outside the cockpit and the interior of the cockpit is a problem which can be eased by the development of an effective helmet mounted display capable of presenting sensor and aircraft position and condition information. In both fixed wing and rotary wing aircraft, a head out of the cockpit attitude is considered to be highly desirable. An effective helmet mounted display is one which is comfortable to use, does not degrade normal visual functioning, can present the required information, and does not increase crew fatigue due to weight and bulk. The general design concerns regarding helmet mounted displays apply to those to be used in a high speed, low level environment. Some of the design parameters take on special significance, however, in high speed low level flight. E.D.K.

N80-30012# Naval Air Systems Command, Washington, D. C.
RESEARCH FOR VISUAL ENHANCEMENT FOR HIGH SPEED LOW LEVEL FLIGHT SPONSORED BY THE NAVAL AIR SYSTEMS COMMAND
H. Rosenwasser, Gloria Twine Chisum (NADC, Warminster, Pa.), J. J. Kulik (Naval Training Equipment Center), M. L. Wolbarsht (Duke Univ.), M. M. Cohen (NADC, Warminster, Pa.), and A.

Lewis (Cornell Univ.) *In* AGARD High-Speed, Low-Level Flight Mar. 1980 11 p refs

(Contracts N00019-78-C-0431; N00019-78-C-3036)
Avail: NTIS HC A14/MF A01

Apart from engineering considerations, the proper emphasis of the various parameters of visual displays in high speed low level flight depends upon the knowledge of the physiological variables in the visual system. Psychophysical tests can best be interpreted in conjunction with a detailed examination of the physiological function of the visual system. A summary of programs is given to show progress in this approach. E.D.K.

N80-30014# Naval Aerospace Medical Research Lab., New Orleans, La.
CREW STATION ASSESSMENT USING THE BIOMAN MODELING SYSTEM
Georg D. Frisch, Louis A. Daulerio, and Michael Schultz *In* AGARD High-Speed, Low-Level Flight Mar. 1980 16 p refs Prepared in cooperation with NADC, Warminster, Pa.

Avail: NTIS HC A14/MF A01

The use of the Bioman modeling system in evaluating the physical compatability of crew members with crew stations under emergency egress conditions is demonstrated and the usefulness of this approach as both a design and evaluation criteria is illustrated. Validated results from F-18 aircraft investigations based both on ejection tower and human physiological acceptance tests are presented to demonstrate the evaluation process of a given crew station. Furthermore, these results are contrasted against those obtained from the A-4 and F-14 and the relative propensity of direct impact injuries are discussed. E.D.K.

N80-30019# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
OPERATIONAL ROLES, AIRCREW SYSTEMS AND HUMAN FACTORS IN FUTURE HIGH PERFORMANCE AIRCRAFT
P. F. Iampietro, ed. Mar. 1980 97 p refs Partly in ENGLISH and FRENCH Presented at the Aerospace Med. Panels Specialist Meeting, Lisbon, 22-26 Oct. 1979
(AGARD-CP-266; ISBN-92-835-0262-0) Avail: NTIS HC A05/MF A01

The understanding of the operational characteristics of high performance aircraft in relationship to the operator's physiological, cognitive, psychomotor and perceptual capabilities is investigated. Relationships between man and machine are discussed in order to identify any biotechnology research deficiencies and establish appropriate selection, training, and assignment criteria for future high performance aircraft.

N80-30023# French Air Force, Bretigny sur Orge. Centre d'Essais en Vol.
WEAPONS SYSTEMS OF THE MIRAGE 2000: MAN MACHINE INTERFACE [LE SYSTEME D'ARMES DU MIRAGE 2000 INTERFACE HOMME MACHINE]
G. Varin *In* AGARD Operational Roles, Aircrew Systems and Human Factors in Future High Performance Aircraft Mar. 1980 15 p In FRENCH
Avail: NTIS HC A05/MF A01

The multipurpose role of the Mirage 2000 aircraft led to the design of a very complex weapon system which includes navigation, automatic pilot, radar, and countermeasures. The use of such a system which already saturates the pilot in combat aircraft actually in service could be still more difficult in the Mirage 2000. In face, considering the maneuverability qualities of the aircraft, which is largely augmented by electric flight control, the Air Army could introduce new combat techniques which would be more trying and more constraining for the pilot. In order to best utilize the capabilities of the Mirage 2000, an important integration effort was made at the cabin level to realize the best compromise in the presentation of parameters and of the controls at the pilot station: displays highly adapted to each flight phase, multiplexed control, and synthetic representation of tactical situations. Transl. by A.R.H.

N80-30024# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
TORNADO - AIRCREW SYSTEMS
E. P. Beck (Royal Navy) *In* AGARD Operational Roles, Aircrew Systems and Human Factors in Future High Performance Aircraft Mar. 1980 7 p refs

Avail: NTIS HC A05/MF A01

Aspects of the aircrew equipment assembly (AEA) for Tornado, including the cabin environment, the escape system, personal equipment and associated supply systems, and survival equipment are considered. The size rolls and integration of preproduction standard items comprising the various AEAs are validated, unforseen man/seat/cockpit incompatibilities are identified, limitations to be imposed on the aircrew population acceptable for Tornado on account of critical anthropometric dimensions are defined, and proposed aircrew drills for strapping-in, emergency ground egress, etc., are refined. E.D.K.

N80-30025# Air Force Avionics Lab., Wright-Patterson AFB, Ohio. Reconnaissance and Weapon Delivery Div.
INFORMATION TRANSFER FOR IMPROVED PILOT PERFORMANCE
Robert N. Lutter *In* AGARD Operational Roles, Aircrew Systems and Human Factors in Future High Performance Aircraft Mar. 1980 6 p refs
Avail: NTIS HC A05/MF A01

The missile intercept confidence factor (MICF) concept was developed to provide the pilot with information about the engagement dynamics of an air-to-air missile engagement. It attempts to account for the critical parameter target maneuver by bounding the possible aerodynamic boundaries, by calculating upper and lower boundary limits. A no-escape target maneuver is utilized to establish the lower boundary and the current maneuver is used for the upper boundary. The MICF factor relates the pilot's position relative to these two boundaries and a minimum range boundary. As an interceptor varies its position within the missile launch envelope boundaries, the MICF varies between a value of zero to one and presents the pilot with an indication of the increasing/decreasing goodness of his launch condition. The MICF allows the pilot to be interactive with the fire control system. Through an assessment of the tactical situation, the pilot can determine whether to accept a low confidence launch or to maneuver to a more favorable launch position. E.D.K.

N80-30026# Panavia Aircraft G.m.b.H., Munich (West Germany). Flight Operations.
HUMAN FACTORS ASPECTS IN HIGH SPEED LOW LEVEL FLIGHT
James L. Dell *In* AGARD Operational Roles, Aircrew Systems and Human Factors in Future High Performance Aircraft Mar. 1980 4 p
Avail: NTIS HC A05/MF A01

Human factors aspects of high speed, low level flying are discussed. There is a direct relationship between crew comfort and operational efficiency. The following areas of comfort are discussed: flying clothing; combined harness, arm, leg, and head restraints; helmets; anti-g protection; ejector seats; cockpit conditioning; cockpit layout; noise aspects; and ride comfort. Other topics include workload and workload sharing, physiological and psychological aspects, spatial disorientation, and detachment phenomenon. E.D.K.

N80-30027# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
ADDRESSING HUMAN FACTOR OPTIONS IN CONCEPTUAL DESIGN
Philip V. Kulwicki *In* AGARD Operational Roles, Aircrew Systems and Human Factors in Future High Performance Aircraft Mar. 1980 15 p refs
Avail: NTIS HC A05/MF A01

The interplay of human factors technology with systems design disciplines during the conceptual phase of development is discussed. Such design features as a full bubble canopy for unobscured vision, fly by wire primary flight control system, modified ejection seat position for better comfort and G-relief

and the hands-on-throttle-and-stick concept for improved subsystem management are examples of the benefits of addressing human factor options in conceptual design. E.D.K.

N80-30028# Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge (France).
HUMAN FACTORS IN MIRAGE 2000 MISSIONS [FACTEURS HUMAINS DES MISSIONS DU MIRAGE 2000]

Henri Vieillefond *In* AGARD Operational Roles, Aircrew Systems and Human Factors in Future High Performance Aircraft Mar. 1980 6 p refs In FRENCH

Avail: NTIS HC A05/MF A01

Like modern aircraft, the Mirage 2000 is characterized essentially by a great degree of controllability, an aptitude to perform at high altitude, and a lessening of the pilot's workload. These three essential characteristics require that the pilot adapt to his aircraft. The great controllability implies very brutal variations of intense accelerations which the pilot must endure. Toleration of repeated accelerations is still poorly understood, especially over a long period, consequently pilot selection must be rigorous. The physiopathological effects of high altitude are better known and effective protection can be proposed. The chances of mission success are real only if the pilot has at his disposal a comfortable environment, which involves ergonometric studies of the seat, of controls, of protective equipment, and of cabin ventilation.
Transl. by A.R.H.

N80-30029 Stanford Univ., Calif.
INTERACTION OF RESPONSES TO ACOUSTIC AND ELECTRIC STIMULI AT THE AUDITORY CORTEX Ph.D. Thesis
Hugh Sherbon Lusted 1980 82 p
Avail: Univ. Microfilms Order No. 8016846

The interaction of tone pips and electrical pulses to the auditory nerve was studied. The evoked cortical response to each type of stimulus was recorded from the primary auditory cortex of barbiturate anesthetized cats. The stimuli were then delivered in time delayed pairs where the interstimulus interval was within the refractory period of the evoked response (typically 50 msec) to either stimulus alone. The amplitude of the cortical response to the trailing stimulus was compared with its single stimulus amplitude as the frequency of the tone pips was changed from 250 through 40 kHz. Results are reported. Dissert. Abstr.

N80-30030 Duke Univ., Durham, N. C.
THE STRUCTURE OF FIBRINOGEN AND ITS INTERMOLECULAR ASSOCIATIONS Ph.D. Thesis
Walter Earle Fowler 1980 120 p
Avail: Univ. Microfilms Order No. 8017140

Fibrinogen was prepared by shadowing with platinum in the conventional manner and by a novel technique of negative staining, which has not previously been used with fibrinogen. With the electron microscope, images were obtained that show a single consistent structure for the fabrinogen molecule in both types of preparations, conforming the trinocular model for fibrinogen. Plasmin degradation products of fibrinogen were examined in the electron microscope using the same preparatory techniques and the structures of these proteolytic fragments were related to the trinodular structure of the intact molecule. This work demonstrates structurally the sequence of events which occurs during the proteolysis of fibrinogen and also allows the well known effects of the various fragments on fibrin polymerization to be interpreted in structrural terms. The mechanism of fibrin polymerization was studied by many different techniques, but the location of intermolecular contact sites on the trinodular molecule and the packing arrangement of these molecules in the fibrin fiber are not known. Fibrinogen dimers were studied in the electron microscope using the same techniques that we developed for the study of single fibrinogen molecules and it was determined that their mode of association is end to end and linear. Evidence is presented that this intermolecular contact and arrangement are the same within the fibrin fiber.
Dissert. Abstr.

N80-30031# Systems Research Labs., Inc., Dayton, Ohio.
EFFECTS OF BACKGROUND ILLUMINATION AND TARGET CONTRAST ON FLASHBLINDNESS RECOVERY TIME
David C. Smedley and Diana R. Nelson Wright-Patterson AFB, Ohio AMRL Apr. 1979 18 p refs
(Contract F00615-76-C-5001)
(AD-A071906; AMRL-TR-79-30) Avail: NTIS HC A02/MF A01 CSCL 06/16

Seven subjects were shown a series of Landolt Cs with gaps oriented one of eight compass directions. After a randomly occurring flash, the subjects were asked to identify the gap orientation of the target. A tungsten halogen lamp was used as the flash source. The duration was 100 msec and the luminance was 60000 foot lamberts. Five background luminances (16,62,120,230, and 575 foot lamberts) and four target contrast ratios (0.1,0.2,0.3 and 0.5) were used in this experiment. Results show recovery times at the 0.1 contrast level differ significantly from those obtained at the other levels regardless of background. Recovery times on the 16 foot lambert background level were significantly different from all other backgrounds regardless of contrast. There were no differences between recovery times at the other constrast levels or background luminances. Author

N80-30032# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
ACCELERATION AND PERFORMANCE MODELING WORKSHOP
Ensor Rodriguez-Lopez, ed., James H. Veghte, ed., and Patricia M. Lewandowski, ed. Dec. 1979 38 p refs Conf. held at Washington, D.C., 14-17 May 1979
(Contract F33615-78-C-0501; AF Proj. 7231)
(AD-A083700; AMRL-TR-79-111) Avail: NTIS HC A03/MF A01 CSCL 06/19

A workshop, sponsored by the Aerospace Medical Research Laboratory, was held to exchange current knowledge in the area of accleration and performance modeling and to provide future guidance. Representatives from the Air Force, US Navy Medical Research Laboratories as well as distinguished academicians participated in this workshop. Two current modeling approaches were presented and provided the basis of later discussions. The participants responses to this effort in this area were favorable and future topics for another meeting were discussed. GRA

N80-30033# SRI International Corp., Arlington, Va.
ON THE INTERACTION OF NON-IONIZING RADIATION WITH PEOPLE
Malvin A. Ruderman and Gordon J. MacDonald Mar. 1980 47 p refs
(Contract MDA903-78-C-0086; ARPA Order 2504)
(AD-A082538; SRI-JSR-79-14) Avail: NTIS HC A03/MF A01 CSCL 06/18

This report examines the physical basis for many of the thermal and non-thermal interactions between microwaves and the human body. Although a microwave beam incident on the human body dissipates, on the average, about the same amount of heat as does normal metabolism, it can actually dissipate considerably more heat in certain local regions of the body because of strong beam focusing effects (e.g., within the brain), flow of induced currents through small, constricted areas of the body (e.g., ankle, neck) and differences in electrical properties among body tissues. Since relatively large heat dissipation can occur on a local level, it would appear more rational to determine a maximum permissive radiation exposure in terms of maximum allowed dissipation in a specific sensitive part of the body rather than, as is presently done, in terms of external beam intensity (the present U.S. standard is 10 milliwatts/sq cm). For non-thermal processes, no special biological process or structure has been identified as likely to be especially sensitive to microwave fields or frequencies. The experimental results designed to explore the non-thermal effect of microwaves were studied. The results of all experiments purporting to demonstrate a significant non-thermal biological effect have been disputed. In fact, very few experiments in the entire field have ever been replicated; a situation which should be rectified. GRA

N80-30034# Kentucky Univ., Lexington.
RESPONSE OF THE CARDIOVASCULAR SYSTEM TO

VIBRATION AND COMBINED STRESSES Final Report, 1 Oct. 1978 - 30 Sep. 1979
Charles F. Knapp Nov. 1979 52 p refs
(Contract F49620-79-C-0034; AF Proj. 2312)
(AD-A081879; AFOSR-80-0203TR) Avail: NTIS HC A04/MF A01 CSCL 06/19

Cardiovascular regulation of acceleration-induced pressure and flow disturbances entails a complex pattern of afferent and efferent neural activity. The global nature of the stress in the levels applied invokes a response from both low and high pressure sensory areas as well as possible mechano-vestibular mechanisms. In this light, it was felt that the dual activation of both peripheral and cardiac efferent activity in response to acceleration stress would disguise the contribution from either mechanisms separately and for that reason a preparation was sought which would allow for delineation of these reactions. As a result, a canine chronic preparation that included a surgically denervated heart thereby permitting a detailed analysis of the peripheral vascular contribution to barostatic regulation has been developed. GRA

N80-30035# Old Dominion Univ., Norfolk, Va. Performance Assessment Lab.
PHYSIOLOGICAL INFLUENCES UPON THE WORK PERFORMANCE OF MEN AND WOMEN Final Report, 1 Nov. 1977 - 31 Dec. 1979
Glynn D. Coates, Raymond H. Kirby, Nancy K. Eberhardt, and Sarah J. Miller Dec. 1979 121 p refs
(Grant AF-AFOSR-3512-78; AF Proj. 2312)
(AD-A081947; ITR-79-22; AFOSR-80-0201TR) Avail: NTIS HC A06/MF A01 CSCL 06/19

The synthetic-work methodology of the Multiple Task Performance Battery (MTPB) was employed in a series of studies designed to determine the effects of 48 hours of continuous work and sleep loss on the work performance of four groups of female subjects and one group of male subjects. The specific female groups were defined in the design by a factorial combination of the phase of the menstrual cycle at the beginning of the sleep-loss period (i.e., Menstrual vs Mid-Cycle) and whether or not the subjects were using contraceptive pills (i.e., Pill vs Normally Cycling). The performances of these four groups of female subjects were compared with those of a group of male subjects who performed the tasks of the MTPB under identical conditions; comparisons were performed during training, during a baseline period, during the sleep-loss, continuous-work period, and during a post-recovery period. An extension of these studies subsequently compared the performances of two groups of female subjects (i.e., Normally Cycling and Pill) for an additional five weeks under normal work conditions; the purpose of this extension was to assess the effects of the phases of the menstrual cycle on work performance. GRA

N80-30036# Texas Univ. Health Science Center, San Antonio.
EFFECTS OF INSPIRED OXYGEN ON THE METABOLISM OF PULMONARY SURFACTANT Final Report, Jun. 1977 - Sep. 1979
Richard J. King, Marita King, and Helen Martin Oct. 1979 31 p refs
(Grant AF-AFOSR-3323-77; AF Proj. 2312)
(AD-A082006; AFOSR-80-0178TR) Avail: NTIS HC A03/MF A01 CSCL 06/16

Exposure to 100% oxygen at 1 atm. pressure has compromising effects on the ability of the lung to carry out gas exchange. The initial stages of injury include decreases in lung compliance, fluid accumulation in interstitial and alveolar spaces, and alveolar atelectasis. It is unknown whether pulmonary surfactant undergoes compositional or functional changes prior to or during the observed pathophysiology. Such alterations, if occurring, would interfere with normal physiological function and could exacerbate other effects of the environmental challenge. In order to better define alterations in surfactant that may result from breathing enriched concentrations of oxygen we exposed pathogen-free Wistar rats to 100% oxygen for 48 hours. In separate experiments we injected 3H-palmitate into rats and followed its incorporation and metabolism in the DSPC of Type 2 cells, alveolar surfactant, and alveolar macrophages. The results indicated that the DSPC moved from Type 2 cells to the alveolus, and at least part was ingested by alveolar macrophages. Overall metabolic flux was unchanged in animals exposed to oxygen. We conclude that breathing 100% oxygen for 48 hours has direct effects on the amount of surfactant in the lung, but probably no effect on the metabolic pathways which regulate its phospholipid composition. These differences probably occur because of metabolic changes in catabolic processes associated with the clearance of surfactant. GRA

N80-30037# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
RADIOFREQUENCY RADIATION AND LIVING TISSUE: THEORETICAL STUDIES Interim Report, Jan. 1978 - May 1979
Richard A. Albanese and Earl L. Bell Dec. 1979 44 p refs
(AF Proj. 7757)
(AD-A085952; SAM-TR-79-41) Avail: NTIS HC A03/MF A01 CSCL 06/18

Basic mechanisms whereby radiofrequency electromagnetic radiation can interact with living tissue were investigated. An elementary statistical physics model of tissue, viewed as a chemical mixture, was considered, followed by a nonquantum physics analysis of macromolecular motion in an electromagnetic field. These studies of basic mechanisms suggest that radiofrequency electromagnetic radiation may be important in its effect on living tissue without causing significant tissue-temperature rises. GRA

N80-30038*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ASSESSMENT OF THE EFFECTS OF THE ZERO GRAVITY ENVIRONMENT ON THE HEALTH AND SAFETY OF SPACE WORKERS
18 Feb. 1980 17 p refs
(Contract DE-AI02-79CH-10025)
(NASA-TM-81122; DOE/CH-10025) Avail: NTIS HC A02/MF A01 CSCL 06S

A review was conducted of currently available information relating to adverse effects to the health and safety that space power system (SPS) space workers may experience. Currently available information on the responses of humans to space flight is somewhat limited and was obtained under conditions which are grossly different from conditions to be experienced by future space workers. The limitations in information and differences in conditions were considered in the assessment of potential health and safety hazards to the SPS space workers. The study did not disclose any adverse effects that would result in long term deviations to the medical physiological health of space workers so long as proper preventive or ameliorating action were taken. DOE

N80-30039# National Technical Information Service, Springfield, Va.
BIONICS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1970 - Apr. 1980
Brian Carrigan May 1980 138 p Supersedes NTIS/PS-79/0568; NTIS/PS-78/0550
(PB80-810641; NTIS/PS-79/0568; NTIS/PS-78/0550) Avail: NTIS HC $30.00/MF $30.00 CSCL 06D

Recent advances in visual information processing, electronic models of nerve cells, and biological sonar systems are discussed in these citations. Theory and applications are included, along with computerized simulation and signal processing. Electrophysiology and modelling of the central nervous system are also included. This updated bibliography contains 132 abstracts, 12 of which are new entries to the previous edition. GRA

N80-30040*# New Mexico Univ., Albuquerque. Technology Application Center.
CIRCADIAN RHYTHMS. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1973 - Jan. 1980
George E. Zollars Apr. 1980 42 p Sponsored by NASA and NTIS
(NASA-CR-163323; PB80-809908) Avail: NTIS HC $30.00/MF $30.00 CSCL 06D

A bibliography containing citations to the international literature concerning circadian rhythms is presented. Topics covered are sleep, body temperature, work-rest cycles, hormone metabolisms, and human physiological responses to various activity cycles. GRA

N80-30041# Naval Aerospace Medical Research Lab., Pensacola, Fla.
A REVIEW OF DYNAMIC VISUAL ACUITY Interim Report
Tommy R. Morrison Mar. 1980 28 p refs
(MF51524004; MR0410103)
(AD-A085860; NAMRL-Monograph-28) Avail: NTIS HC A03/MF A01 CSCL 06/16

In many everyday situations relative motion exists between human beings and the visual information which they must acquire and resolve in order to perform their tasks successfully. In particular, tasks, such as flying aircraft, driving automobiles and other vehicles, and resolving moving information presented via visual displays, impose a requirement on the human operator to process moving information. Since Dynamic Visual Acuity (DVA) is a critical visual skill involved in performing such visual tasks, the present review was undertaken in order to better understand the visual skill and to provide a basis for continuing research in this area. GRA

N80-30042# Human Engineering Labs., Aberdeen Proving Ground, Md.
HUMAN PERFORMANCE: PSYCHOLOGICAL AND SEX DIFFERENCES, A SELECTED BIBLIOGRAPHY
Gerald A. Hudgens and Linda L. Torsani-Fatkin Feb. 1980 163 p
(AD-A085824) Avail: NTIS HC A08/MF A01 CSCL 05/10

The bibliography is a compilation of 1571 references dealing with, or related to, the effects of sex differences on human performance. The material is organized into four categories: An Overview of Sex Differences, Physiological Sex Differences, Sex Differences in Cognitive and Motor Abilities, and Sex Differences in Personality. The time period covered is roughly from the 1930's into 1979. An index of first authors is included. GRA

N80-30043*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PRESSURE SUIT JOINT ANALYZER Patent Application
Hubert C. Vykukal and Bruce Webbon, inventors (to NASA) Filed 11 Jul. 1980 13 p
(NASA-Case-ARC-11314-1; US-Patent-Appl-SN-168943) Avail: NTIS HC A02/MF A01 CSCL 06Q

A measurement system for simultaneously measuring torque and angular flexure in a pressure suit joint. One end of a joint under test is held rigid, and a torque transducer is pivotably supported on the other movable end of the joint. A potentiometer is attached to the transducer by an arm. The wiper shaft of the potentiometer is gripped by a reference arm that rotates the wiper shaft the same angle as the flexure of joint. A signal, generated by the potentiometer, is representative of the joint flexure angle, and a compensation circuit coverts the output of the transducer to a signal representative of joint torque. NASA

N80-30044# Technology, Inc., San Antonio, Tex. Life Sciences Div.
PROCEDURAL TESTS FOR ANTI-G PROTECTIVE DEVICES. VOLUME 2: G-SENSITIVITY TESTS Final Report, 1 Oct. 1976 - 30 Jun. 1978
Roy W. Thompson, Carmen E. Galvin, James E. Allred, Paul E. Love, and Larry J. Meeker Dec. 1979 203 p
(Contract F33615-77-C-0610; AF Proj. 7930)
(AD-A085982; SAM-TR-79-31-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 06/11

In this volume, an examination of anti-G valve failures is reported, as well as the results of 9 short term investigation dealing with acceleration protection equipment and studies on the USAFSAM Human Centrifuge. These studies involved: the CWU-9/P undergarments; the Statham PM131TC pressure transducer; the Ready Pressure Anti-G valve; the ALAR 'High flow' and 'Special' anti-G valves; accelerometer calibration, continuous ECG recording; control-center data distribution; closed-loop centrifuge control; and the Medilog recorder. GRA

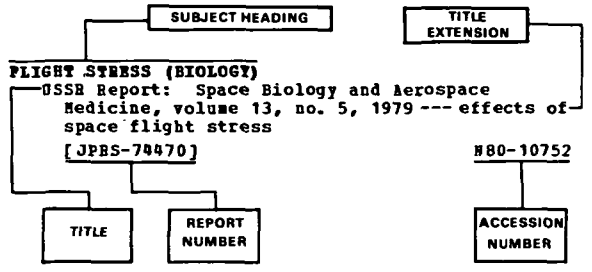
N80-30045# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THERMAL AND ACCELERATION EFFECTS ON AIRCREW MEMBERS IN CHEMICAL DEFENSE GEAR Technical Report, Nov. 1978 - Jan. 1979
Ronald E. Yates, Clyde R. Replogle, and James H. Veghte Jan. 1980 36 p refs
(AF Proj. 6893)
(AD-A086026; AFAMRL-TR-79-71) Avail: NTIS HC A03/MF A01 CSCL 06/19

An experiment was conducted to determine the combined thermal and acceleration effects on aircrew members in chemical defense protective gear in a simulated air-to-ground mission. The subject flew two sorties per day in the Dynamic Environment Simulator. The environmental conditions simulated were typical of a 95th percentile hot summer central European day. Most of the responses seen in the subjects can be attributed to the thermal stress caused by the hot temperatures and the heavy protective clothing. GRA

N80-30046# Essex Corp., Alexandria, Va.
HUMAN ENGINEERING DESIGN CRITERIA FOR MODERN CONTROL/DISPLAY COMPONENTS AND STANDARD PARTS Final Report
David R. Eike, Thomas B. Malone, Stephen A. Fleger, and Jimmie H. Johnson May 1980 171 p refs
(Contract DAAK40-79-C-0144)
(AD-A086139; DRSMI/RS-CR-80-1) Avail: NTIS HC A08/MF A01 CSCL 05/8

A study was conducted to identify requirements for modification of MIL-STD-1472B to include human engineering design criteria for modern controls and displays; and to reduce the incidence of requests for waiver of MIL-STD-1472 resulting from unavailability of standard parts. Recommended changes are presented with rationales and references. GRA

Typical Subject Index Listing



The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, a title extension is added, separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

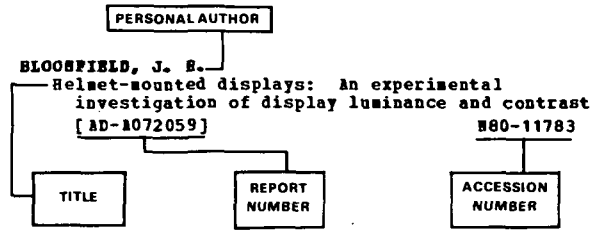
V

W

Page Intentionally Left Blank

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



The title of the document is used to provide the user with a brief description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

C

D

E

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

Y

Z

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7011 (212)		

4. Title and Subtitle	5. Report Date
AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography (Supplement 212)	November 1980
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, D. C. 20546	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This bibliography lists 146 reports, articles, and other documents introduced into the NASA scientific and technical information system in October 1980.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerospace Medicine Bibliographies Biological Effects	Unclassified - Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	58	$7.00 HC

*For sale by the National Technical Information Service, Springfield, Virginia 22161

NASA-Langley, 1980

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
OKLAHOMA
University of Oklahoma, Bizzell Library
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

7 1 SP-7011, 112880 S90569AU 850609
NASA
SCIEN & TECH INFO FACILITY
ATTN: ACCESSIONING DEPT
P O BOX 8757 BWI ARPRT
BALTIMORE MD 21240

NASA CONTINUING BIBLIOGRAPHY SERIES

NUMBER	TITLE	FREQUENCY
NASA SP-7011	AEROSPACE MEDICINE AND BIOLOGY Aviation medicine, space medicine, and space biology	Monthly
NASA SP-7037	AERONAUTICAL ENGINEERING Engineering, design, and operation of aircraft and aircraft components	Monthly
NASA SP-7039	NASA PATENT ABSTRACTS BIBLIOGRAPHY NASA patents and applications for patent	Semiannually
NASA SP-7041	EARTH RESOURCES Remote sensing of earth resources by aircraft and spacecraft	Quarterly
NASA SP-7043	ENERGY Energy sources, solar energy, energy conversion, transport, and storage	Quarterly
NASA SP-7500	MANAGEMENT Program, contract, and personnel management, and management techniques	Annually

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546